American Aviation

JANUARY 14, 1957

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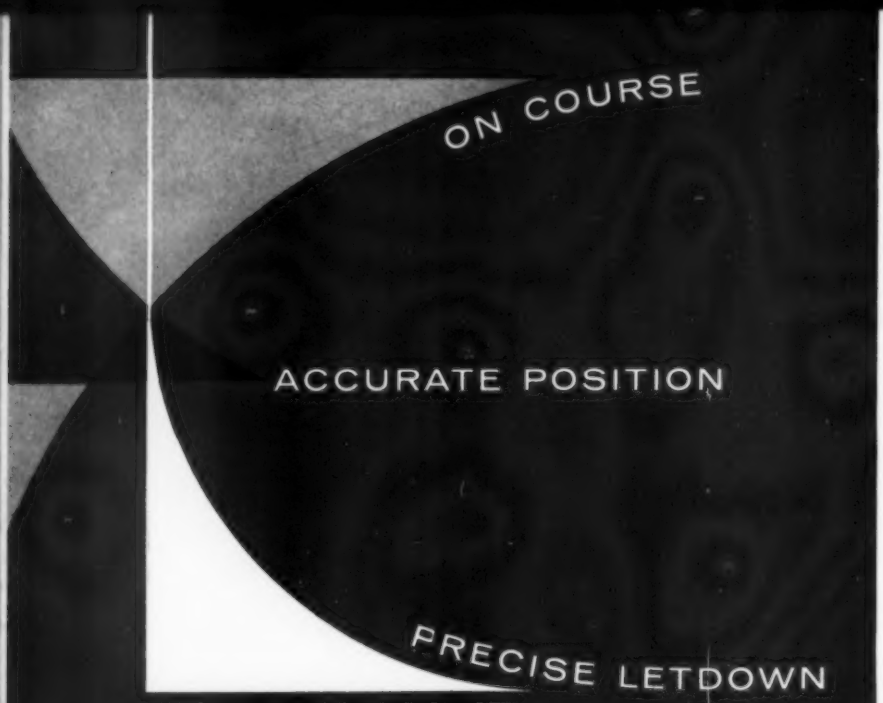

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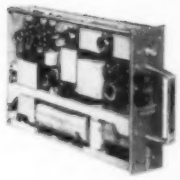

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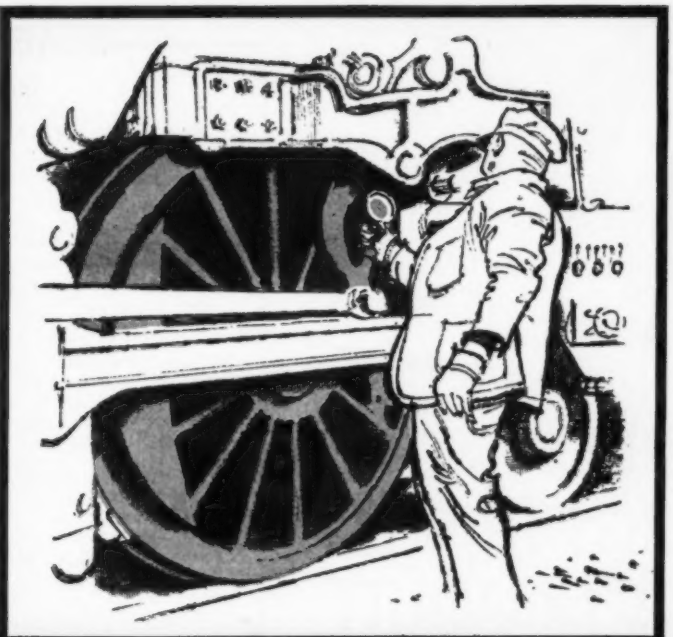
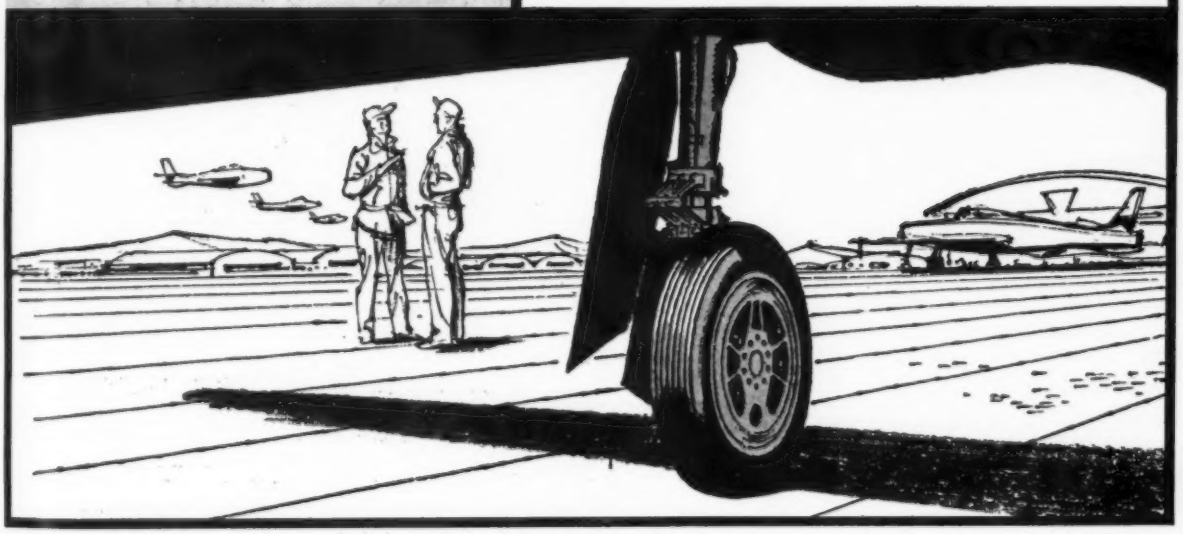
Fourteenth and Chestnut

Which wheel is the strongest?





Above is the drive wheel of a giant locomotive.

The other is an airplane wheel of a modern-day jet fighter.

Which wheel is the strongest?

You air-minded ones are right.

It's the forged light-alloy wheel designed and produced by Goodyear Aviation Products: *pound for pound it can roll a record capacity.*

Forged wheels of magnesium or aluminum typify weight-saving developments—without sacrifice of performance—made by Goodyear Aviation Products for the aeronautics industry.

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In the case of aluminum or magnesium wheels, it called for detailed study which produced forgings of uniform quality and grain flow—and the elimination of "gingerbread" castings.

Goodyear forged light-alloy wheels are operational on more aircraft of more types, both military and commercial, and in more sizes and types, than any other kind.

In the case of a ship you now have upon the boards—this strength-to-weight engineering may well extend the range, the altitude, the firepower of your project. Call in a Goodyear man—get the facts, and the help of this kind of thinking! Write: Goodyear, Aviation Products Division, Akron 16, Ohio, or Los Angeles 54, California.

GOODYEAR
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AMERICAN AVIATION

Voice of the Industry Since 1937

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Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $200 per year. Managing Editor—Mary Miller.
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BPA NBP

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Personal View

By WAYNE W. PARRISH

Here's A Job For the New Congress

THE RENEGOTIATION Act of 1951 is playing havoc with major aircraft builders.

Intent and purpose of the Act was to protect the government against excessive profits. As carried out currently by the Renegotiation Board, it is throwing a real hooker into companies whose records for efficiency, performance and profits are above reproach.

Congress must review the Act this year. It must either advise the Renegotiation Board that the Board's interpretations are not reflecting the intent of Congress, or it must alter the Act radically.

First victim of an exceedingly unfair charge was Boeing Airplane Co. The Renegotiation Board said it had made $10 million excessive profits in 1952. Boeing is taking the case to the Tax Court with an extremely strong protest.

Just recently a regional Renegotiation Board ruled that Douglas Aircraft profits for fiscal 1953 were excessive in the gross amount of $9 million.

Clyde Skeen, controller of the Boeing company, told the New York Society of Security Analysts last month that the main source of the trouble is the Renegotiation Board's arbitrary use of the return on net worth as the criterion for determining excessive profits.

Book net worth, or invested capital, is by no means indicative of the true worth of the company, Skeen pointed out. It gives no consideration of efficiency nor to the reasonableness of costs of articles furnished. It does not recognize that earnings for a specific year are the result of a design, development and manufacturing cycle that extends over a substantial number of years. And it gives no recognition for contribution to the defense of the country through the development of advanced weapons.

The harmful affects of the Renegotiation Board's pattern of thinking are incalculable. Not only is the Board a destructive force against the nation's national defense enterprise, but it is acting directly against the wishes and intent of Congress when the law was enacted.

Absence of Responsibility

Here's a really strange one.

The Civil Aeronautics Board has been disturbed about "leaks" of its decisions prior to formal announcement. So some time ago it adopted a procedure of issuing a press release immediately after taking a vote and following up this release some time later with a formal order.

It was with some reason, thusly, that airlines relied upon the press release announcement as having some authenticity.

But no. Not so. Now the CAB says that "a press release does not constitute the Board's decision, and members retain the right to change or modify their vote prior to issuance of a formal opinion and order."

In addition, as a recent case indicates, the members retain the right to change their vote after issuance of a formal opinion and order. One airline that was awarded a new stop, both by press release and subsequent formal order, immediately went to work to set up the new station, and then had the rug yanked out from under it later by a "reconsideration" decision which eliminated the stop.

Judicial? Common sense? The CAB should stop using cat-and-mouse techniques on serious matters like new routes and stops, which affect the welfare and destinies of people and companies. Time to grow up.

One In, One Out

We were glad to see James Pyle given the White House nod as CAA Administrator. With proper support topside in the Commerce Department, he should do well.

We thought the White House was wise not to reappoint Joseph P. Adams to the CAB. A very personable, likeable man, Adams lacked the stature and maturity needed in a regulatory post. He was a crusader without due regard to overall consequences. He will doubtless remain in some phase of aviation where his boundless energies and enthusiasm may well be directed to more useful ends.

Needless Hazard

Maybe CAA and CAB can put the heat on the Federal Communications Commission to do something about abandoned radio and television towers. In the news recently was the business aircraft which crashed into the 810-foot WOR tower on the Hudson River Palisades not far from its goal, Teterboro Airport. It was a nasty accident. But the real story is that the tower was erected in 1948 and abandoned in 1953. It is bad enough to have these high towers reaching into the skies all over the country but it's worse when their owners aren't forced to tear them down when no longer used.

When & Where

JANUARY

National Symposium on Reliability and Quality Control in Electronics, sponsored by IRE, AIEE, RETMA and ASQC, Hotel Statler, Washington, D.C., Jan. 14-15.

SAE Annual Meeting and Engineering Display, Sheraton-Cadillac and Statler Hotels, Detroit, Jan. 14-18.

Engineers Joint Council general assembly, Hotel Statler, New York City, Jan. 17-18.

Helicopter Assn. of America annual meeting, Sheraton-McAlpin Hotel, New York City, Jan. 21-23.

Plant Maintenance Show, eighth annual, Public Auditorium, Cleveland, Jan. 28-31.

Institute of the Aeronautical Sciences, 25th annual meeting, Sheraton-Astor Hotel, New York City, Jan. 28-Feb. 1.

Convertible Aircraft Pioneers annual meeting, Engineers Club, New York City, Jan. 30.

Agricultural Aircraft Assn., annual convention, Hotel California, Fresno, Calif., Jan. 31-Feb. 2.

FEBRUARY

Instrument Society of America, Aeronautical Div. of New York Section annual mid-winter conference, Garden City Hotel, Garden City, L. I., Feb. 7.

Annual Jet Age Conference, sponsored by Air Force Assn., Sheraton-Park Hotel, Washington, D.C., Feb. 14-15.

Western Joint Computer Conference, sponsored by IRE, AIEE and ACM, Hotel Statler, Los Angeles, Feb. 26-28.

Management Research Symposium on Transportation, Purdue University, Lafayette, Ind., Feb. 27-28.

MARCH

National Conference on Aviation Education, sponsored by National Aviation Education Council, Mayflower Hotel, Washington, D.C., March 7-8.

Nuclear Congress & International Atomic Exposition, Convention Hall, Philadelphia, Mar. 11-15.

IAS Flight Propulsion Meeting (classified), Hotel Carter, Cleveland, Mar. 14-15.

Gas Turbine Power Conference, sponsored by ASME, Sheraton-Cadillac Hotel, Detroit, Mar. 18-21.

American Society of Tool Engineers, Silver Anniversary meeting, Shamrock-Hilton Hotel, Houston, Tex., Mar. 25-27.

Western Metal Exposition and Congress, sponsored by American Society for Metals and other technical groups, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles, Mar. 25-29.

APRIL

SAE Aeronautic Meeting and Production Forum, Hotel Commodore, New York City, Apr. 2-5.

IRE Professional Group on Telemetry and Remote Control, national symposium, Philadelphia, Apr. 15-17.

Arnold Air Society annual conclave honoring 50 years of military air power, Hotel New Yorker, New York City, April 17-20.

Airport Operators Council, Conrad Hilton Hotel, Chicago, Apr. 28-May 2.

Washington Report

USAF Combats Missiles

Watch for Air Force to step up its campaign to convince taxpayers—and Congress—that missiles will not replace manned combat aircraft for a long, long time.

It is a foregone conclusion that the Democratic-controlled 85th Congress is not likely to be stingy with defense funds. But the lawmakers could rearrange the amounts of funds earmarked for various projects in such a way as to curtail development of essential projects—like the chemical and nuclear bombers.

For this reason, USAF is apprehensive about all the talk of long-range ballistic missiles as "ultimate weapons." To offset any tendency to chip away the manned bomber programs in favor of the more glamorous missiles, Air Force can be expected to put even more emphasis on the manned aircraft in coming months.

Security Decisions Due

Acceptance of Coolidge Report recommendations on Defense security policies is moving along through the Pentagon.

A special Defense committee of three studying the report sent a confidential preliminary memo to Secretary Wilson shortly after Jan. 1, but it supposedly was a progress report rather than specific moves for adoption.

Plans call for analyzing each recommendation of the Coolidge group before final decision.

To prevent "leaks" and speculation on its actions, the Pentagon committee plans to release each decisive move to the public as it is made.

Recommendations adopted into policy will be released in blocks of about five, along with suggestions rejected.

The Coolidge group, appointed last August and headed by Charles A. Coolidge, was charged with responsibility of coming up with "vigorous measures" to stop security leaks to the press.

SWG-13 Study: Wasted Effort?

Prolonged delay by Commerce Dept.'s rewrite group in coming up with an "acceptable" version of the report of Air Coordinating Committee's SWG-13 continues to stir apprehension that the 34-month-long work done by that group may go down as the biggest wasted effort in Washington committee history.

Crux of the situation, observers feel, is that Commerce officials are afraid to say what the committee specialists feel should be said about the basic concepts a future ATC system should follow. One reason: pressure from Capitol Hill on behalf of private flying interests reportedly has started to flow in Louis B. Rothschild's direction.

The almost impossible task facing the rewriters is to come up with a guideline for future ATC policy that will achieve the same end without stirring up too much of a hornet's nest among light-plane owners. But the real issue at stake—whether the U.S. eventually will have the best, or just a next-best ATC system—appears to be completely sidetracked in the present effort to overcome political problems with pleasing language in a vital report.

Result could be that the whole meaning of the approved ATC document may be changed in the "watering-down" process. It might even find its way back into the ACC Nav Panel for some more wasteful committee handling.

Whatever its path, it is a good bet that if present trends persist ACC will turn over to Presidential Aide Edward P. Curtis something short of what the experts think is the only sound concept of traffic control for the country's future.

Bilateral Talks Start

A series of bilateral talks between U.S. and foreign countries gets under way this week when discussions with Cuba start at Havana.

Cuban airlines, particularly Cubana, reportedly feel they are not getting a big enough break in the U.S.-Cuba market.

Next month another Bermuda conference between the U.S. and Britain will be held, to be followed by negotiations with the Netherlands, Belgium and Switzerland. Results of the Bermuda meeting will have a major effect on the latter talks, which primarily will be concerned with getting West Coast U.S. routes for KLM, Sabena and Swissair.

In the spring, State Dept. officials will go to Rio de Janeiro for discussions on the bilateral with Brazil.

Chan Gurney, CAB Veteran

Departure of Joseph P. Adams from Civil Aeronautics Board elevates Republican Chan Gurney to role of senior Member. Gurney will have completed six years with CAB Mar. 12. He joined the Board in March 1951, served out the unfilled term of Harold A. Jones, was reappointed to new six-year term beginning Jan. 1, 1953.

Adams was senior to Gurney by one month. Only other current Member with more than one year's service is Harmar D. Denny, who joined the Board April 6, 1953.

Pentagon Exodus

Defense Secretary Charles E. Wilson is not the only top brass expected to make an early departure from the Pentagon.

Among others: Reuben Robertson, Jr., mentioned as a successor to Wilson, reportedly wants to leave his Deputy Defense Secretary post to return to private business; Assistant Secretarys Frank Newbury (engineering) and Dr. Clifford C. Furnas (R&D) are slated to step down.

Three Assistant Navy Secretaries also are said to be ready to resign: Raymond H. Fogler, materiel; Albert Pratt, personnel and reserve forces, and William B. Franke, financial management.

Another important post expected to be open soon is that of Special Assistant to Secretary of Defense for Guided Missiles, now held by Eger V. Murphree. Murphree reportedly is determined to return to Esso Research and Engineering Co., of which he was president until he joined Defense last year.

THE ERA OF THE ELAND IS BEGINNING...

The case for ELAND conversion

To forward-looking operators of medium-haul airlines the case for ELAND conversion becomes clearer and more convincing month by month. Increasingly they see that ELANDS point the way to the achievement of better performance, greater earning capacity, and greater dependability in service from well-proven airframes.

No beat, whine or whistle

ELANDS possess to the full that inherent asset of the turbo-prop—a greatly reduced noise level. And over and above this they have an inherent asset of their own—a complete absence of beat, whine or whistle. The passenger appeal implicit in this needs no emphasis.

Flexibility of power

ELAND design provides a wide range of power in a one-sized package. The 3,000-4,200 e.h.p. range of ELAND engines differ nothing in size and only little in overall weight. This flexibility will enable operators to standardize on one basic engine and nacelle design where two or three different types of piston engines are now required.

Conversion of the Convair 340

The Napier Eland Convair—a Convair 340 which we bought from the makers and converted to ELANDS—has proved the simplicity of ELAND installation, the low lost of conversion and the increased profits that accrue from ELAND operation.

From studies made of the published direct operating costs (including depreciation) of a number of typical airlines, it is proved that in the light of our guarantees a converted aircraft will be cheaper to operate—whether the costs are calculated on the basis of aircraft miles, ton miles, or passenger miles. The ELAND-engined Convair 340 can carry its maximum payload 930 miles further than piston-engined Convairs, and its cruising speed is 50 m.p.h. higher.

In short, we offer to operators of the Convair—and other medium-haul 'planes—an airliner with a new lease of life at a cost which will be written off over a relatively short period. That is the essence of the case for ELAND conversion.

Eland conversion means increased profits to the progressive airline

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Three examples of successful Napier Eland conversions: the Convair 340, the Elizabethan, the Varsity.

CRC E35

Letters

More About Spinners

To the Editor:

We were very interested in Fred Hunter's West Coast Talk in your Nov. 5 issue in which he informs that Douglas and Hamilton Standard are producing propeller spinners for DC-6B airplanes. He tells of the advantages in a spinner installation, all of which are true and very complimentary to a spinner we have tooled to produce.

We have been manufacturing a cowl flap modification kit and complete ring cowl anti-drag rings of a more streamlined design to replace original cowls on DC-3. The anti-drag rings are CAA approved for installation on P&W R1830-75 and -94 engines; however, due to the -92's marginal cooling ability, we have hesitated to try for approval.

We now believe that our spinner installation will aid in cooling enough to meet CAA requirements on this engine. We expect the spinners, spinner afterbodies and our cowling installation to boost the DC-3's cruising speed a good honest 25 mph, and by reducing the drag on the dead engine, we expect to raise the single-engine altitude about 5,000 feet. Preliminary flight tests already have proved that our spinner is a definite asset to performance and cooling in all flight conditions.

Spinners will be off the production line shortly and approval tests will start then.

DOUGLAS MINER
President,
Miner's Aircraft & Engine Service, Inc.
Seattle, Wash.

Appreciation

To the Editor:

I want you to know how much we at Ryan appreciate the two Personal Views in the Dec. 17 issue of AMERICAN AVIATION magazine—those concerning General Kinney and especially your sympathetic comments regarding Duke (Adm. DeWitt C.) Ramsey. . . .

WILLIAM WAGNER
Director,
Public & Employee Relations
Ryan Aeronautical Co.
San Diego, Calif.

Army's "Aerial Jeep"

To the Editor:

Your article "How Army Views Its Future Flying Needs" (AMERICAN AVIATION, Dec. 3, 1956, p. 22) has aroused considerable attention here at Consolidated American because we have, at this time, designs for a small, highly maneuverable aircraft employing completely enclosed fluted turbines.

Your article states that "An Army design competition will be ordered soon" for new aircraft. We would like very much to have the opportunity to submit our designs in this competition.

Therefore, if you have any further information . . . we would appreciate hearing from you.

W. H. BRAUN, JR.
Director of Research
Consolidated American Industries, Inc.
Culver City, Calif.

Editor's note: The competition to which the article referred is one proposed by Army for an "aerial jeep." Here is what Maj. Gen. Hamilton Howze, Army aviation director, said about it recently: "This vehicle should weigh about 1,000 pounds and have a payload of about 1,000 pounds. It could mount radio equipment, machine-guns, and could, we feel, even mount a 106-mm rifle. This vehicle, too, will be air transportable. We are going out on design competition for a vehicle of this type this year (1956) and we hope to have it ready for troop test by 1959."

Correction

To the Editor:

I would like to call attention to an oversight in the "New Books" section of your December 3 issue. In a review of a recent McGraw-Hill release, "Properties of Combustion Gases," your reviewer states that the tables encompass only a single pressure (0.01 atm.) and a single equivalence ratio (0.25).

As one of the principal contributors to these tables, along with Drs. S. N. Suciu and S. R. Brinkley, Jr., I would like to point out that the tables actually encompass 22 pressures between 0.01 and 30 atm. (incl.) and 15 equivalence ratios between 0.25 and 4.00 (incl.). The data are tabulated in 100°R increments.

I feel that the actual scope and content of the tables would be of interest to a number of your readers in the fields of aircraft design and propulsion.

HUGH N. POWELL
Aircraft Gas Turbine Div.
General Electric Co.
Cincinnati, Ohio

Wants Reprints

To the Editor:

We read with considerable interest your article in the Dec. 31 issue of AMERICAN AVIATION entitled "First Details of New AF Doppler Navigator" (by Henry P. Steier) and are anxious to obtain five hundred to one thousand reprints.

WINNIE LEE
Sales Dept.
Laboratory for Electronics, Inc.
Boston, Mass.

EDITOR'S NOTE: The reprints are being supplied Laboratory for Electronics.

AMERICAN AVIATION invites readers to take advantage of its reprint service. Reprints of all material published in the magazine are available at nominal cost.

Speaking of Africa

To the Editor:

I have been reading with a great deal of interest your stories of your trip to Africa and the Belgian Congo. They were particularly interesting to me because I was in most of the places that you mention in your articles, almost three years ago. We were in Africa for three months—did no shooting but took thousands of pictures. I have a wonderful collection, got every animal but a leopard.

JOHN H. LEH
Chairman,
Lehigh-Northampton Authority
Allentown-Bethlehem-Easton Airport Allentown, Penna.

Industry News Digest

British Magazine Reveals New Details Of U.S. Missiles, Including Atlas

The Convair Atlas intercontinental ballistic missile is an unconventional single-stage vehicle boosted by a pair of liquid-propellant rocket motors in jettisonable nacelles mounted alongside the sustainer motor, according to the British magazine, *Flight*.

In a comprehensive round-up of world guided missile developments appearing in its Dec. 7, 1956, issue, *Flight* publishes many details of the U.S. ballistic missile programs. It gives this description of the Atlas:

• **The weapon stands** about 100 feet in height and weighs about 90,000 pounds. It is powered by a single sustainer motor of 135,000 pounds thrust which fires for the full 180-second burning period, plus the two boosters of 100,000 pounds each which are discarded at burn-out. All three motors are North American liquid-propellant powerplants supplied by turbopumps at the rate of 1,800 pounds per second.

American Bosch Arma Corp. is said to have principal responsibility for Atlas guidance, with assistance from Bell Telephone Laboratories and the Univac Div. of Sperry-Rand Corp. Avco reportedly has primary responsibility for the nose cone and re-entry body of the Atlas, with help from Lockheed and General Electric. (Although all these companies have previously been identified with the ICBM program, their exact relationship with individual projects has not been disclosed by the USAF.)

• **The Martin Titan** is reportedly a conventional two-stage weapon with the sustainer mounted directly above the booster. Aerojet-General Corp. is responsible for the first stage motor, with Reaction Motors, Inc., serving as a major subcontractor for chambers. GE is said to have primary responsibility for both the nose cone and guidance system of the Titan.

Until 1954, annual outlays for ICBM development amounted to less than $1 million annually, and the work was almost canceled completely in 1953, according to the British periodical. Convair drawing boards at that time would have revealed a 200-foot missile of three stages weighing approximately 200 tons, it said, while propulsion for the first stage would have required seven motors of 125,000 pounds thrust each.

Flight cited two major breakthroughs operating to ease the ICBM development task: The size and weight of the warhead was drastically reduced, permitting a substantial reduction in the size of the weapon, while the megaton yield of the smaller warhead was boosted so sharply that guidance requirements could be met within the existing state of the art.

No performance details were given for the Air Force's Thor intermediate range ballistic missile (IRBM), but it was stated that the Douglas weapon is a single-stage affair using components developed by the ICBM program. These include a liquid-oxygen motor from Rocketdyne Div. of North American, nose cone from GE, guidance from A.C. Electronics Div. of General Motors Corp., with help from Bell Telephone Laboratories and Univac, and auxiliary propulsion units from American Machine and Foundry.

The British magazine also reported these details of other advanced U.S. missile projects:

• **Navaho**—Original design target of Mach 2.5 and 65,000 feet for this North American 5000-mile ramjet missile has been far exceeded. Current figures are Mach 3 at 75,000 feet and it is later hoped to attain 90,000 feet. Power will be supplied by two 48-inch Curtiss-Wright ramjet engines of 30,000 to 40,000 pounds thrust each mounted at the tips of the weapon's stubby wings. Typical skin temperature is said to be 300° F. Weapon may join USAF in 1958.

• **Bomarc**—Powered by two Marquardt ramjet engines of 28-inch diameter, this Boeing weapon has attained a slant range of 200 miles in free firings and it is hoped it will achieve 300 by the time it goes into service. Engines can deliver about 10,000 pounds thrust at Mach 2.5-3. Boost is supplied by a single large Aerojet solid-propellant rocket.

• **Talos**—Powered by an 18-inch ramjet, this Bendix surface-to-air weapon has a slant range of 42-45 miles, a maximum speed of Mach 2.5 and an overall weight of 2,500 pounds, including solid-propellant booster.

• **Bomber Defense Missiles**—General Electric is said to hold a prime contract for the development of such a weapon, with support from Hughes Aircraft, Bell Telephone Laboratories and Raytheon Mfg. Co. Other contracts in this field are reportedly held by American Bosch Arma and Republic.

• **Rascal**—Bell air-to-surface missile measuring 35 feet in length and weighing 13,000 pounds. A Bell triple-barrel liquid-propellant rocket engine of 6,000 pounds thrust propels it at Mach 1.5. Range is given as 100 miles. Launching is reportedly similar to that of the Bell X-1 series of experimental rocket research aircraft, with the missile programmed to climb to a cruise altitude of about 100,000 feet. Federal Telecommunications Laboratories, Nutley, N.J., was brought in on guidance early last year.

Four-Jet Auto Checks Aircraft Arresting Gear

Track-guided and driverless auto, powered by four Allison J33-A16 jets, has been developed by All American Engineering Co. for Navy Bureau of Aeronautics' testing of aircraft arresting gear. Total of 28,000 lbs. thrust permits auto to achieve 200-mph speeds.

U.S. Airline Jet/Turboprop Transport Orders

Airline	Boeing 707	Douglas DC-8	Lockheed Electra	Convair 880	DeHavilland Comet	Vickers Viscount	Bristol Britannia	Total
American	30	—	35	—	—	—	—	65
Braniff	5	—	9	—	—	—	—	14
Capital	—	—	—	—	14	75	—	89
Continental	4	—	—	—	—	15	—	19
Delta	—	8	—	10	—	—	—	18
Eastern	—	20	40	—	—	—	—	60
National	—	6	23	—	—	—	—	29
Northeast	—	—	—	—	—	—	5	5
Pan American	23	25	—	—	—	—	—	48
TWA	8	—	—	30	—	—	—	38
United	—	30	—	—	—	—	—	30
Western	—	—	9	—	—	—	—	9
TOTALS	70	89	116	40	14	90	5	424

U.S. Airlines Committed to $1.3 Billion Orders for 213 Jets, 211 Turboprops

U.S. scheduled airlines entered 1957 with outstanding orders for 424 four-engine turbine-powered transports valued at an estimated $1.3 billion dollars. Of the total, 213 were purejets, 211 turboprops.

Airline roster of jet or turboprop buyers now includes every major trunk except Northwest, and that carrier has indicated its intent to spend $50 million for jets.

Topping the list of aircraft manufacturers on the basis of numbers sold is Lockheed Aircraft Corp. with 116 Electra turboprops sold to five airlines. In the lead dollar-wise is Douglas with 89 DC-8 jets valued at about $500 million.

Douglas also ranks third in numbers sold, falling one short of the 90 Viscount turboprops sold by Vickers-Armstrong to Capital and Continental Air Lines.

• **Boeing Airpline Co.,** running Douglas a close race for the big jet market in the U.S., ranked fourth in aircraft sold but second in dollar-volume at the year-end. Boeing, however, appeared in the best position to alter this standing early in 1957, reportedly with orders from TWA for an additional 21 aircraft and from Northwest for 10.

Although still to be announced, these orders would move Boeing into second place to the Electra numerically and perhaps edge Douglas out of the top spot dollar-wise.

Of the total of seven aircraft types now ordered by one or more airlines (see table), Convair's Model 880 small jet ranked fifth, with 40 sold to two carriers. Britain's De Havilland Comet sixth, with 14 slated for Capital Airlines and the Bristol Britannia seventh with five to go to Northeast.

Of the 424 aircraft total, British sales represent a healthy share—the Viscount/Comet/Britannia trio accounting for 109 or 26%.

President Nominates Louis Hector to CAB

President Eisenhower has selected Louis J. Hector, 41-year-old Miami attorney, to serve as a Civil Aeronautics Board Member for the next six years. Also, the President has designated James R. Durfee to continue as Board Chairman for 1957.

In selecting Hector, the President announced his "intention to nominate" the Floridian. Formal transmission of the nomination to Congress was expected momentarily. Approval of the Senate Foreign & Interstate Commerce Committee and the full Senate are prerequisites to actual assumption of duties by Hector. A Democrat, Hector will occupy the seat held for the past six years by Joseph P. Adams. Adam's term was not renewed upon expiration last December 31. Hector is a graduate of Williams College and Yale University Law School. In 1936, he won a Rhodes Scholarship to Oxford University.

He has been associated with the Miami law firm of Hector and Rutledge and with Hector Supply Co., a Miami agricultural supply and fertilizer concern. In 1944, he served as assistant to Secretary of State Edward R. Stettinius following several years service with the Justice Department and the Lend-Lease Administration.

Hector has had no past aviation experience, having specialized in corporate finance and Federal administrative law. He is described as an "Eisenhower Democrat" as a result of his support for the President in the 1952 and 1956 elections. He is the first CAB Member from Florida and the first Southerner to be named to that Board since Georgia's Harllee Branch who was named to the original Board in 1938 and served until 1948.

New Feature Reports Directors' Stockholdings

As a special feature, AMERICAN AVIATION presents in this issue the latest official list of stockholdings of directors of 22 aircraft firms (page 57).

The list, compiled by AMERICAN AVIATION's research department, is an important addenda to the voluminous report by the Hebert House subcommittee findings in connection with aircraft company profits. It shows that company directors hold less than 5% of outstanding common stock in those firms.

National Airlines Names Gewirtz Vice President

Stanley Gewirtz has resigned as vice president and assistant to the president of the Air Transport Association to become a vice president of National Airlines, effective Feb. 15. He will be based in Miami.

Gewirtz

Gewirtz, 39, was elected a v.p. of ATA in December, 1955. During the previous two years he had served as executive assistant to the ATA president. From 1946 to 1948 he had been executive assistant to CAB Chairman James M. Landis.

NAL also advanced Washington attorney Richard A. Fitzgerald from assistant v.p. to v.p. and William B. Caldwell Jr. from director of economic research to assistant treasurer.

AF, Navy Contracts for 4 Months: $3.2 Billion

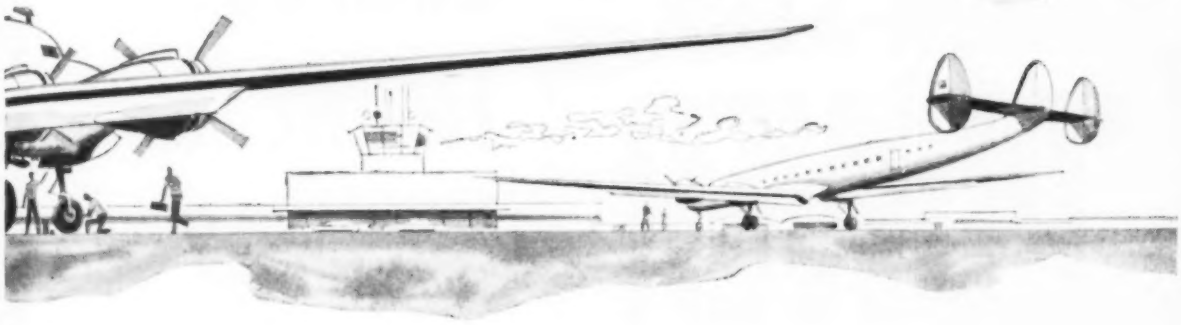
Air Force and Navy contract awards for aircraft, missiles, drones and related production facilities totaled $3,235,000,000 during the first four months of fiscal 1957.

USAF contracts amounted to $181 million in October, bringing its four-month total to $2,190,000,000. Navy's October contracts were $206 million, with the July-October period totaling

(*Continued on page* 17)

FOR ANTI-COLLISION SYSTEMS!

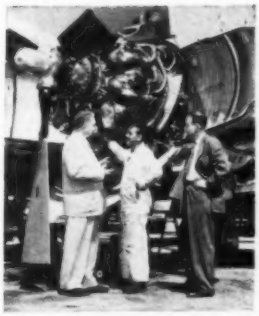
With anti-collision systems slated for early installation, and with weather radar now aboard or planned, your planes will need considerably more electric power. Anticipating this need, Jack & Heintz has developed and flight proved a 450-amp d-c generator and a 3000-va inverter. Flight tests have shown the units to be ideal for commercial use. By simply replacing existing generators and inverters... on a 1-for-1 basis... you can effect system power increases of 20% or more. And you get this added power with very little weight penalty.



450-AMP GENERATOR

Comparable in size and weight to present lesser power machines, the J&H G23-5 mounts readily on such universally used reciprocating engines as Wright R-3350 series and P&W R-2800 series.

Because more power is obtained with the same number of generators as now in use, you keep system complexity down. And by eliminating the need for additional generators you save accessory pad space which becomes more important as new electromechanical, pneumatic and hydraulic devices are developed for airline use.

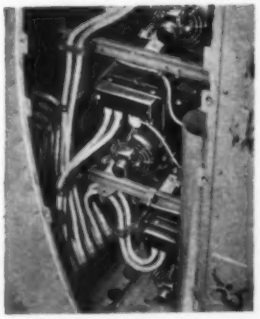


J&H field engineers consult with airline personnel on installation of G23-5's.

3000-VA INVERTER

Designed after the popular J&H F45-5 (2500 va) which is used extensively by airlines, the J&H F45-10 gives 500 va more power while weighing only ½ pound more.

Approximately 90% of the parts used in the F45-10 are completely interchangeable with the F45-5 . . . simplifying maintenance and stock problems. If you are now using F45-5's you can convert them quickly to a 3000-va rating with a special kit available from Jack & Heintz.



Three J&H F45-10 3000-va inverters installed on Douglas DC-7C.

BOTH POWER UNITS ARE AVAILABLE IMMEDIATELY

Consult with J&H engineers or write for further data to: Jack & Heintz, Inc., 17633 Broadway, Cleveland 1, Ohio.
Export Department: 13 East 40th Street, New York 16, New York.

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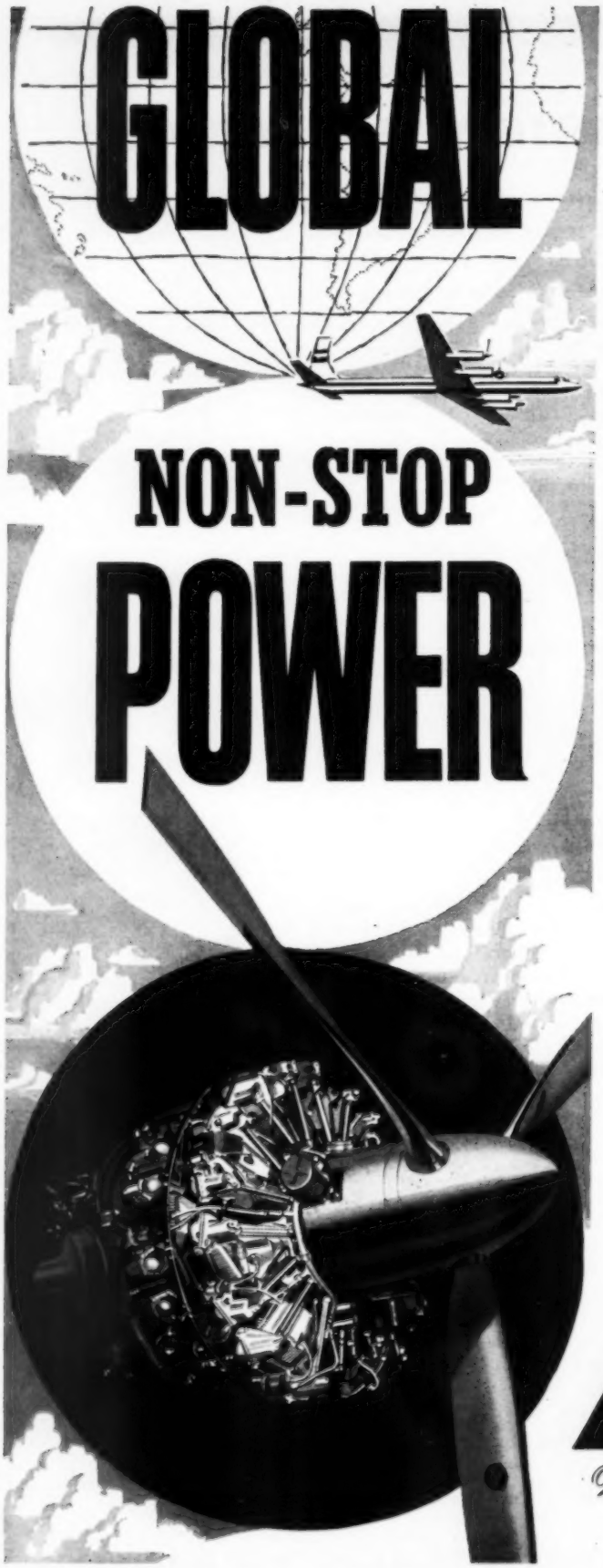

New TURBO COMPOUND ENGINE

broadens the concept of world travel

Air travelers and airlines agree: the more non-stop service the better. Passenger traffic has increased in recent years in direct ratio to the increase in range of modern airliners . . . an increase made possible by the high efficiency of the Curtiss-Wright Turbo Compound® engine.

Now the new EA Series Turbo Compound, with still higher hour-after-hour cruise power, makes it possible for the airlines to offer non-stop service from continent to continent . . . fly you *anywhere in the world* you want to go, faster than ever before. It is a powerplant that can fly the Polar and Great Circle routes, spanning 6000 and more miles, or staying aloft for 24 hours plus. Watch for speed, distance and endurance records to topple as the EA takes to the air.

WRIGHT AERONAUTICAL DIVISION
CURTISS-WRIGHT
CORPORATION • WOOD-RIDGE, N. J.

World's Finest Aircraft Engines

Industry News Digest

(*Continued from page* 13)

$1,045,000,000.

On the spending side, USAF and Navy paid out $782 million for aircraft, missiles and equipment in October and $2,697,000,000 for the four months. USAF figures for October and for the four months were $613 million and $2,117,000,000, respectively; Navy's were $169 million and $580 million.

News Briefs

MANUFACTURING—MILITARY

• **Minneapolis-Honeywell Regulator Co.** received a half million dollar study contract from Air Research and Development Command for development of a "new type of air-to-ground rocket," suitable for delivery by fighter aircraft. Missile controls laboratory of M-H's aeronautical division will carry out design work and build mockups and windtunnel models of the rocket.

• **Carl G. Holschuh** was named president and general manager of Sperry Gyroscope division of Sperry Rand Corp., succeeding Charles M. Green, whose retirement from Sperry became effective at the end of 1956. Holschuh, who has been with the company since 1933, served as executive v.p. and general manager for the past two years.

• **Two firms** which will do subcontract work for The Martin Company's Titan ICBM program will open facilities in Denver. They are Associated Missile Products Corp., of Pomona, Calif., and Hallamore Electronics Co., Anaheim, Calif., a division of the Siegler Corp. of Chicago.

• **Bell Aircraft Corp.** was awarded a $1,652,099 USAF contract for work on adapting its aircraft landing system to land-based aircraft operations. Bell's system has been under development for the Navy for use on aircraft carriers.

• **Cessna Aircraft Co.** reported record earnings of $4,205,830 in the fiscal year ended Sept. 30, 1956, up 48% from the previous year. Record sales totaled $66,266,927 against $50,001,409 in 1955.

• **Collins Radio Co.** received a $19.5-million Navy BuAer contract for airborne multi-channel communications equipment in the HF range. Contract covers 2,500 AN/ARC-38 transceiver systems and over 1,100 AN/ARR-41 receivers, plus other equipment. Also included is $3.9 million for spare parts.

TRANSPORT

• **Cyrus S. Collins,** an assistant vice president of Pan American-Grace Airways since 1953, was named vice president-sales and traffic, succeeding the late Edward G. Bern. Collins joined Panagra in 1942.

Trans-Canada Places $67-Million Order For 20 Vanguards for 1960 Delivery

Trans-Canada Air Lines has placed a $67-million order for 20 Vickers Vanguard turboprops and an $11.7-million option for four others.

Deliveries will start in the fall of 1960 and end in time for 1961 summer service. TCA then plans to dispose of or retire its Super Constellations, North Stars and DC-3s.

J. T. Dyment, director of engineering, said TCA studied 10 types of aircraft and "would like to have bought jets" but was impressed that jets can be operated very economically only down to 700-mile stage lengths. TCA's average route requirement, he added, is 380 miles and jets are "economically out of the question."

As an example, Dyment pointed out that the Vanguard on New York-Toronto service will be only 12 minutes slower than a jet cruising 150 mph faster. He indicated doubt that the turboprop transport will attain speeds above 450 mph because of high propeller-tip speeds and the consequent noise.

TCA initially will receive Tyne 2 engines rated at 5,315 ehp but later will convert to Tyne 3s rated at 5,760 ehp. The Tyne engine is slated to be developed to that rating by about 1963, with provisions for modification from the first-to-second, or second-to-third development stage during routine overhaul.

The TCA engineering official said one of the reasons the Vanguard was preferred over the Lockheed Electra was its substantially greater cargo capacity. The Vanguard 952 ordered by TCA, with its "double-bubble" fuselage arrangement, will have two large underfloor cargo compartments of 1,410 cu. ft. total capacity.

Dyment indicated TCA plans to get all possible utilization from the aircraft by operating them in all-cargo/-mail services at night. He noted that the Electra combination with the Tyne engine, as offered by Lockheed, would have been faster, but that TCA preferred the larger airplane.

The Vanguard 952 will gross, 141,000 lbs., 6,000 lbs. more than previously announced and 28,000 lbs. in excess of Lockheed's latest specification on the Electra.

• **Conference of Local Airlines** will expand its Washington set-up by leasing office space and hiring an assistant for chairman John F. Floberg. Expansion was deemed necessary because of several items coming up this year that are of primary interest to the locals. Included is CAB investigation of the locals' rates of return, and the capital gains bill expected to be introduced in Congress.

• **U. S. Court of Appeals** for the Second Circuit affirmed a lower court decision which enjoined the Village of Cedarhurst, N. Y., from enforcing its ordinance against flights at less than 1,000 ft. above the village.

Arrayed against the village in the test case were CAA, CAB, Port of New York Authority and 10 airlines.

• **Five intra-Alaskan airlines** were awarded permanent certificates by CAB, in line with legislation passed by Congress last summer. The five, whose new certificates become effective Mar. 1, 1957, are Alaska Airlines, Cordova Airlines, Ellis Air Lines, Northern Consolidated and Reeve Aleutian.

• **Braniff Airways** reported $1,800,258 net profit for the first 11 months of 1956, a 14% gain over the same 1955 period. Operating revenues were up 13% to a record $48,230,956. Revenue passengers totaled 1,670,550, up 9%.

• **TWA's application** to suspend transatlantic flights to and from Chicago and Detroit until May 15, 1957, was approved by CAB.

Production Spotlight

• Various versions of the North American Aviation F-86 Sabre fly from more than 50 bases throughout the world as first line fighters.

• Workhorse system in Douglas DC-8 jet transport will be hydraulics. Aircraft's 3,000-psi hydraulic system will hold about 30 gals. fluid, including a 14-15-gal. reservoir. This is about double capacity of DC-6/7 systems. Hydraulics will power rudder, aileron, horizontal stabilizer, landing gear, nosewheel steering, wheel brakes, wing flaps, spoiler and speed brakes.

• F-86 assembly line at NAA-Los Angeles plant has switched to production of the F-100F two-place version of the Super Sabre. Switch was made without laying off any personnel.

• Curtiss-Wright, which lost out to Aeroproducts on supplying propellers for the Lockheed C-130A, reportedly will supply props for the new version of the turboprop transport, the C-130B.

• Avro Vulcan, Britain's big delta-wing bomber, still is many months away from operational use.

• Italy may produce the Hawker Hunter trainer version and other British products if present Hawker negotiations with Macchi are successful.

• Iberia, Spanish airline, is interested in CASA's Model 207 Azor twin-engine transport for its domestic routes. CASA expects government order for 10.

• Aerfer/Ambrosini's Sagitario 2 lightweight fighter prototype has exceeded Mach 1.1 in a dive from 45,000 ft. A new version of this aircraft, the Ariete, is scheduled to fly in May.

• Convair has received a $4.2-million Air Force contract for the F-106B, a tandem-seat version of the single-seat delta F-106A. Both are powered by Pratt & Whitney J75.

• France's Leduc 022 ramjet aircraft is in the Mach 2 class. First prototype flew last month.

• Penn State's Plato study project for a missile interceptor system has been terminated.

• There now are at least five anti-missile development study projects. Contracts are held by Hughes, Martin, Convair, North American and Sylvania Electric.

• English Electric's P.1 fighter has exceeded 1,000 mph in level flight, with refinements is expected to be capable of 1,500 mph. It is an anti-missile as well as anti-bomber fighter.

• First Chance Vought F8U-1s have been allocated to fleet use. Two Crusaders now are at Patuxent River Naval Air Test Center, others are scheduled for delivery this month for fleet indoctrination program.

• Britain's Edgar Percival Aircraft plans to build 150 of its Lycoming-powered agricultural aircraft by the end of 1957. Firm has produced 20 to date.

• Pentagon security on the Pratt & Whitney J75 and GE J79 continues to impede sale of U.S.-built commercial jet aircraft to foreign countries.

• Navy's Terrier surface-to-air missile has reached 1,500 mph.

• France's two biggest aircraft companies—Sud-Est Aviation and Ouest Aviation—may be merged, with Georges Hereil, now top man at Sud-Est, as president.

AMERICA'S NUCLEAR COUNTER-PUNCH has far longer reach and greater power now that the Boeing KC-135 Tanker-Transport has been developed. It's a jet-powered aerial refueling station that extends the striking range of our first-line intercontinental bomber—the Boeing B-52 Stratofortress—by thousands of miles.

PIPELINE IN THE SKY. Boeing solved the problem of refueling America's long-range jet bombers with this retractable, winged boom. In operation, the boom is extended 47 feet. As the bomber nuzzles up to the tanker, one of the crewmen actually "flies" the boom into its final contact.

BIG WIND FROM THE NORTHWEST. In Seattle, Boeing has added to its already extensive wind tunnel facilities a supersonic tunnel capable of velocities four times the speed of sound. No other airplane company owns so advanced and versatile a proving ground for its future jet aircraft designs.

AMERICA'S FIRST JET AIRLINER—The Boeing 707 is now in production. With over two years of experimental and demonstration flights completed, the 707 is the only American jet transport now in the air—the result of Boeing's unparalleled experience as builder of the nation's long-range jets. Eleven major airlines have already chosen the Boeing 707 for service on world-wide routes.

BOEING

AIRCRAFT ANTI-COLLISION development program has hit its first big snag. Collins Radio Co., which won Air Transport Association's approval last August with its FM-CW radar system proposal, has released ATA and airlines from any commitments, including more than $10 million in equipment orders.

Collin's explanation: Subsequent research has raised grave doubts that the system could be developed in practical form on the promised timetable, using known techniques. And if developed, the system would be subject to such operating limitations that its usefulness for proximity warning would be far short of airline expectations.

The result: Development competition between manufacturers has been reopened. Millions in orders will go to the first to produce a practical and usable device. Among the competitors, but no longer with a long lead, is Collins.

●

LONG-RANGE MISSILES will be integrated into Strategic Air Command within the next five years. Present USAF planning calls for introducing a degree of missile capability into SAC in late fiscal 1958.

No firing capability is expected at that early date. But enough hardware is expected to be delivered so that training can start. Some training will be carried out by Western Development Command at Camp Cooke, Calif., but a great deal will be done by SAC itself—component assembly, fueling, parts, etc. Some missile battery construction may also start. Missile bases will be widely dispersed but plotted around SAC bases which will serve as support areas.

SAC will need manned bombers for years to come. Aim is to obtain maximum use of both bombers and missiles. However, phase-out of SAC fighter support is expected on premise that need for such support is reduced as bombers become faster and rocket defense is perfected.

●

USAF HAS BIGGER WORRIES than the number of wings it's allowed to maintain. Top USAF officers say problem of wing strength has been overemphasized. Real heart of the money problem is getting enough funds for (1) procurement of hardware, (2) training and retention of personnel, (3) research and development.

Fiscal 1958 request for R&D money is inadequate, USAF says. There'll be enough for the top-priority ICBM program. But money will be skimpy for chemical and nuclear bombers, Navaho, B-58, C-132 and other projects.

Claim is made that, with the exception of the Navy, U.S. has already surrendered quantitative superiority to Russia. Fear is that qualitative superiority may also be lost by a lag in R&D.

●

IF MERGER of France's two major aircraft firms, Sud-Est and Ouest, goes through (see page 18), the new company will have more workers than Martin and almost as many as Republic Aviation. It will be known as Sud Aviation, will probably be headed by Georges Hereil, Sud-Est's top man. Georges Glasser, head of Ouest, may leave to join a big French industrial group. Glasser's departure would raise a problem for French Aircraft Industries Association. He's chairman of the group and as such would be top man at this spring's international aircraft show in Paris.

A NEW FORCE FOR FREEDOM SPREADS ITS SUPERSONIC WINGS

Convair's B-58...America's first SUPERSONIC Bomber!

Leading the way today with the delta shape of tomorrow! Convair's B-58 supersonic bomber brings new dimensions of protection to help preserve a world of continuing peace. **CONVAIR-FORT WORTH** developed and perfected the delta wing into America's *first* supersonic bomber—proof again of Convair's leadership through **Engineering to the Nth power!** Like the already famous delta-wing F-102A Interceptor, also developed by Convair, the B-58 offers the U.S. Air Force an added new supersonic *force for freedom!*

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New fuel cell baffles 11,900 lb. surge pressure

When the spectacular Douglas F4D Skyray takes off from a Navy carrier, it blasts out and up at a record-setting pace.

Imagine the surge pressure set up in a longitudinal fuel cell by such a catapult take-off—or during an arrested carrier landing. It would be sudden and devastating—as much as 11,900 pounds of surge pressure that would burst a conventional fuel cell.

Obviously, this problem had to be solved before making test flights. Development engineers of the B. F. Goodrich Aviation Products division, called in by Douglas, worked out a solution.

They designed a cell containing a series of special baffles, dividing the interior into compartments. The baffles were reinforced with steel cables to soak up surge pressures and transmit them to the airframe. The resulting B. F. Goodrich fuel cell combined maximum strength with minimum weight. It is proving itself successful in every flight of a Skyray.

For the best solutions to your fuel cell problems, call upon experienced engineers of B. F. Goodrich Aviation Products.

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VOL. 20 No. 17

Polaris: Navy's New Entry in Missile Race

Five-year program aims at development of 800-mile underwater- or surface-to-air weapon tailored to fleet needs.

By HENRY T. SIMMONS

The Navy has virtually abandoned its joint development effort with the Army on the Jupiter mid-range ballistic missile and has quietly fashioned a program of its own to achieve an 800-mile Fleet Ballistic Missile within the next five years.

To be called the Polaris, the new missile will be capable of carrying nuclear as well as thermo-nuclear warheads. It may be launched from surface vessels as well as from submarines lurking beneath the ocean surface in shallow coastal areas.

One unique feature of the stubby weapon is the fact that it will be powered by a solid propellant. The Navy chose this approach in its desire to avoid the problems of handling nitric acid, liquid oxygen and other cantankerous liquids aboard ship.

Four Firms on 'Team'

To carry out development of the Polaris, the Navy has selected a team of four top contractors:

- Airframe—Missile Systems Division of Lockheed Aircraft Corp. This is easily MSD's most important missile assignment learned to date. The division is also working on nose cone problems for the Air Force's Atlas and Titan intercontinental ballistic missiles.
- Propulsion—Aerojet-General Corp., Azusa, Calif. Aerojet shares with North American the responsibility for developing liquid propulsion units for the Atlas and Titan.
- Guidance—General Electric Co. and Massachusetts Institute of Technology. Both are active in the development of guidance systems for the Air Force's ICBM weapons.

The Navy's development of a completely integrated Fleet Ballistic Missile program is the primary reason for its complete lack of concern over Defense Secretary Charles Wilson's decision in November to transfer control over the Army Jupiter project to the Air Force, effective July 1, 1957.

Since it is doubtful that the Air Force will continue to finance more than a small fraction of the Jupiter development program along with its own Thor IRBM project, many observers felt that the Navy's FBM project would suffer.

Reason for this view was the fact that the Army and Navy originally commenced work on the Jupiter as a joint development project under the control of the Army Ballistic Missiles Agency at Redstone Arsenal, Huntsville, Ala. With Army participation in the program coming to an end, and little likelihood that the Air Force would continue to foot the bills, it was feared that the Navy's ballistic missile program would be left in a hopeless snarl.

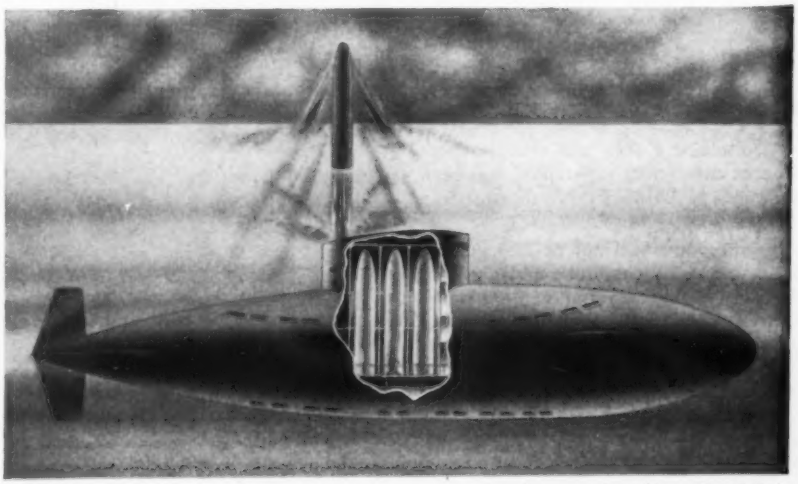
Happily, this will not take place. Because of its previous work on the Polaris with a team of its own contractors, the Navy needs only to expand the scope of certain of its contracts to assure continued development of the weapon.

Although as now conceived the 800-mile Polaris is a considerably less ambitious weapon than the 1,500-mile Jupiter on which the Navy originally set to work, it will be far more manageable aboard ship and should meet the bulk of the Navy's responsibility for strategic targets on land.

Guidance, of course, is one of the knottiest problems confronting the Navy in the development of a long-range ballistic missile. Unlike land-based missile sites, whose coordinates do not change once they are plotted, a ship or submarine capable of launching long-range missiles must determine its precise location every time it takes a new position—and, moreover, it must do so with fantastic accuracy.

To handle the guidance problem, the Navy will resort to the Ship Inertial Navigation System (SINS) developed by Dr. Charles Draper of the Instrumentation Laboratory of Massachusetts Institute of Technology. It is designed to determine ship position by latitude and longitude, true north and ship speed over the ground—and to do this in all weather, at all latitudes and independent of shore-based aids.

To check the accuracy of Dr. Draper's SINS, the Navy has installed the system in a converted merchant vessel equipped with a very large sonar



Artist's conception of a future Navy nuclear-powered submarine launching the Polaris ballistic missile from an underwater position. The solid-propellant weapons will be capable of smashing targets up to 800 miles away with nuclear and thermonuclear warheads.

A Chance Vought Regulus guided missile is drawn out of its special "storage bottle" aboard a Navy submarine. Two of the surface-to-surface weapons can be carried in the chamber—the second stored in an upside-down position and removable after the first is fired. Note folding wings.

system for accurate measurement of speed, special fins for stabilization of rolling movements and a 67-ton navigational tower in the superstructure to provide fixed reference points for celestial computations.

Until the new Polaris missiles enter the Navy on an operational basis, the fleet will make use of the Chance Vought Regulus missile, powered by the Allison J33 turbojet engine to meet its requirements for surface-to-surface missiles. The Regulus may be launched from both surface vessels and submarines (while surfaced), and its range is said to be on the order of 600 miles. It will soon be supplemented by the supersonic Regulus II, to be powered by the General Electric J79 turbojet engine.

AF Gets First F-86L From North American

The first F-86L, a modernized version of the F-86D interceptor, has been delivered to USAF by North American Aviation.

The plane will not be incorporated into operational units. USAF ordered 10 for use by its Cambridge Research Center at Hanscom Field near Lexington, Mass., to check out the data link system which will integrate interceptors like the F-101 and F-102 into the SAGE system for control of air defense.

The F-86L incorporates advanced electronic gear, new extended wing leading edges and new wing tips that add a foot to each wing. Improvements make for greater maneuverability, lower takeoff and landing speeds, better target detection, reduced pilot effort and simplified ground control.

Standard Factors Enters Aircraft Financing

Standard Factors Corp., a commercial finance company with $30 million in resources, has entered the aircraft financing field.

The firm, with headquarters at 270 Medison Ave., New York, plans to furnish airlines with new and used planes on a rental plan with an option to buy the equipment at pre-determined prices when other financing becomes feasible. It will also finance purchase of used planes by "secondary" airlines, with such aircraft to be leased back on a "pay-as-you-go-out-of-income" basis.

Theodore H. Silbert, president, said Standard Factors has financed a number of purchase-leaseback deals involving 14 new and used transports on an experimental basis since early 1955.

Of these, 12 have been leased to five carriers, and two new Lockheed 1049H Super Constellations are on order.

Britannia to Enter Service February 1

BOAC's board of directors has decided to introduce the Britannia into scheduled service on February 1.

The airline stated that "modifications made by Bristol to prevent icing troubles which occurred in the engines under certain atmospheric conditions have been fully tested and found satisfactory by both Bristol and BOAC."

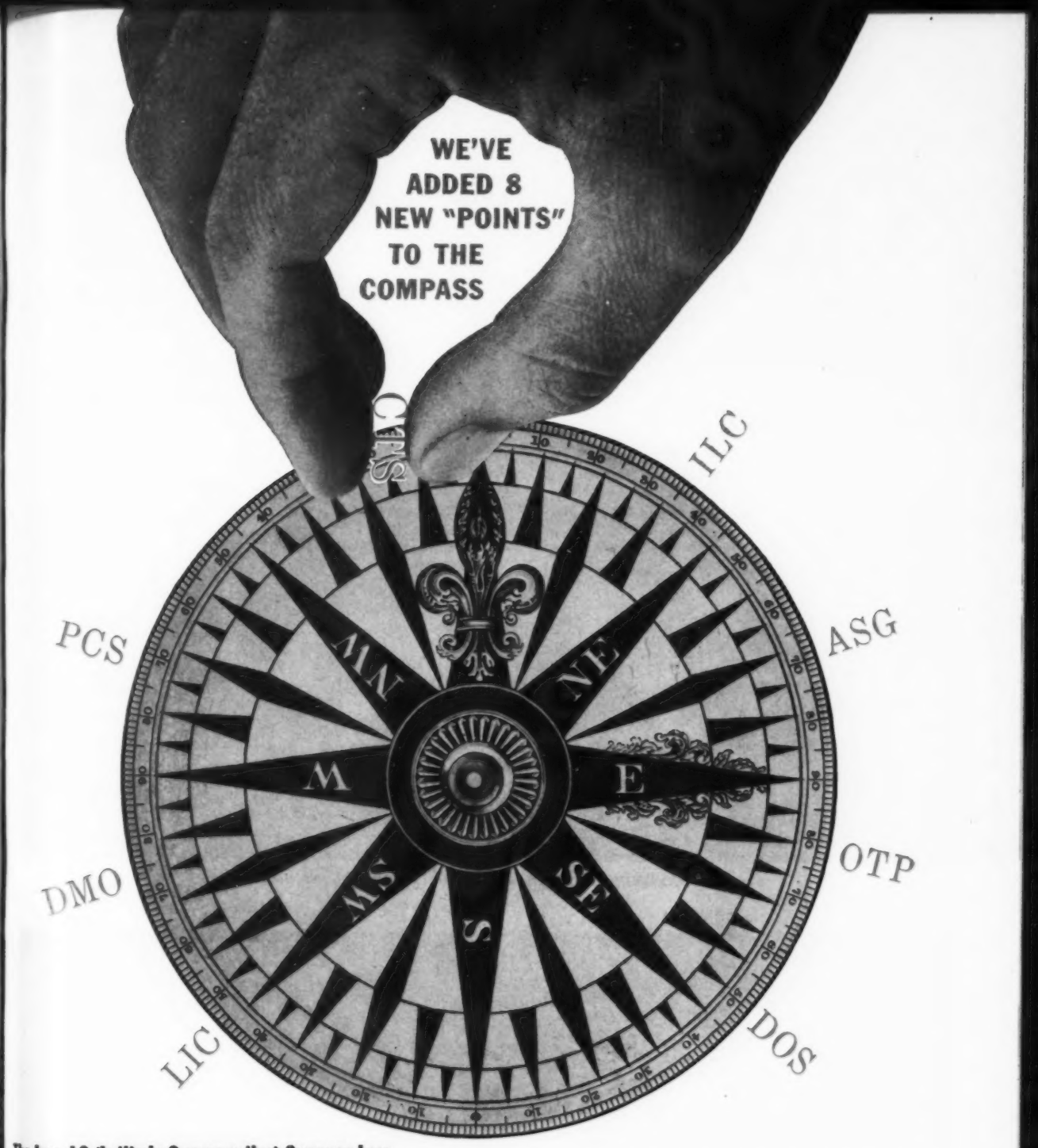
The Britannias will be introduced on the London-Johannesburg route February 1.

A month later BOAC intends to place the aircraft on the London-Australia run and on routes to Hongkong, Tokyo, Aden, Ceylon and Singapore in the latter part of 1957.

Platinum glow-plugs are being installed in the flame tubes of the Proteus engines of BOAC's Britannia fleet. Another modification involves alteration of the Proteus' air entry duct to prevent the formation of ice.

ARDC Sets Indoor Altitude Record

USAF's Maj. Arnold I. Beck, shown through viewer panel of a 50 cu. ft. aeromedical altitude chamber at Wright Air Development Center, is pictured at a simulated height of 198,770 ft. Maj. Beck attained the height while testing a new Model MC-4 partial pressure suit for fighter pilots produced by Berger Brothers Co., Inc. of New Haven, Conn. A companion suit, MC-3, has been developed for bomber crews by David Clark Co., Worcester, Mass.



The Lear LC (Latitude Compensating) Compass has:

CTS – completely transistorized system – for longer life, elimination of tube unreliability, and significant reduction in weight, space, and power required.

DOS – direct output synchros – right on the outer frame of gyro to eliminate backlash and signal inaccuracy due to servo gear trains.

OTP – only two package system – for ease of installation and maintenance, greater compactness, and reduction of weight because of minimum inter-connecting cabling.

ILC – internal latitude compensation – for accurate performance at any point on the earth's surface.

PCS – printed circuit system – for greater dependability and reduction in weight and cost.

ASG – all steel gyro – exclusive design reduces variation in drift due to temperature change; provides free drift of less than 4 degrees an hour.

DMO – dual mode operation – providing a "slaved" mode for areas of normal magnetic flux, and a "free" mode for areas of magnetic disturbance.

LIC – lowest in cost – considerably less than any other compass of its type. Yet the Lear LC exceeds every performance specification laid down by the Bureau of Aeronautics, U.S. Navy, for the MA-1 type of compass.

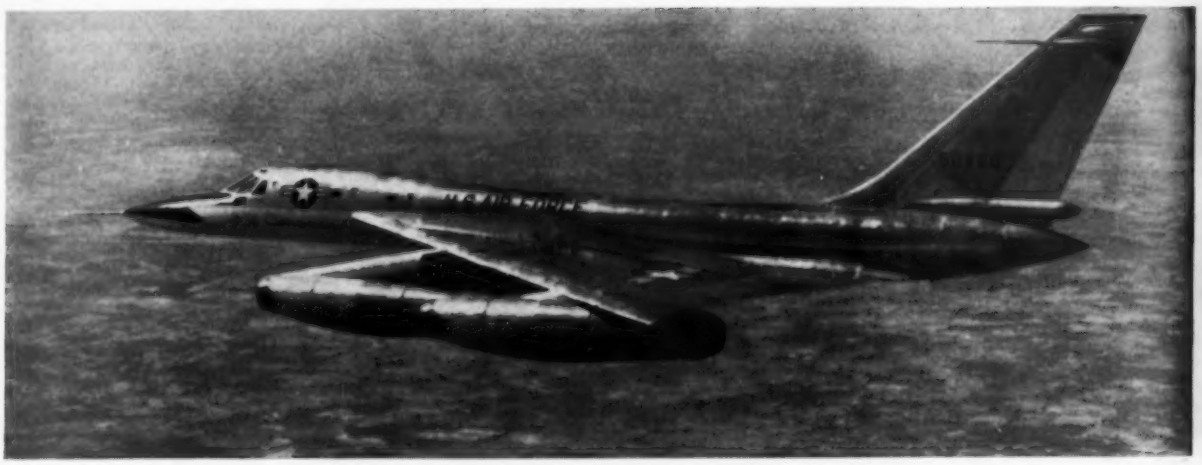
LEAR LC COMPASS

Gyro-stabilized compass system providing accurate directional heading and autopilot control for aircraft under all conditions anywhere on the globe.

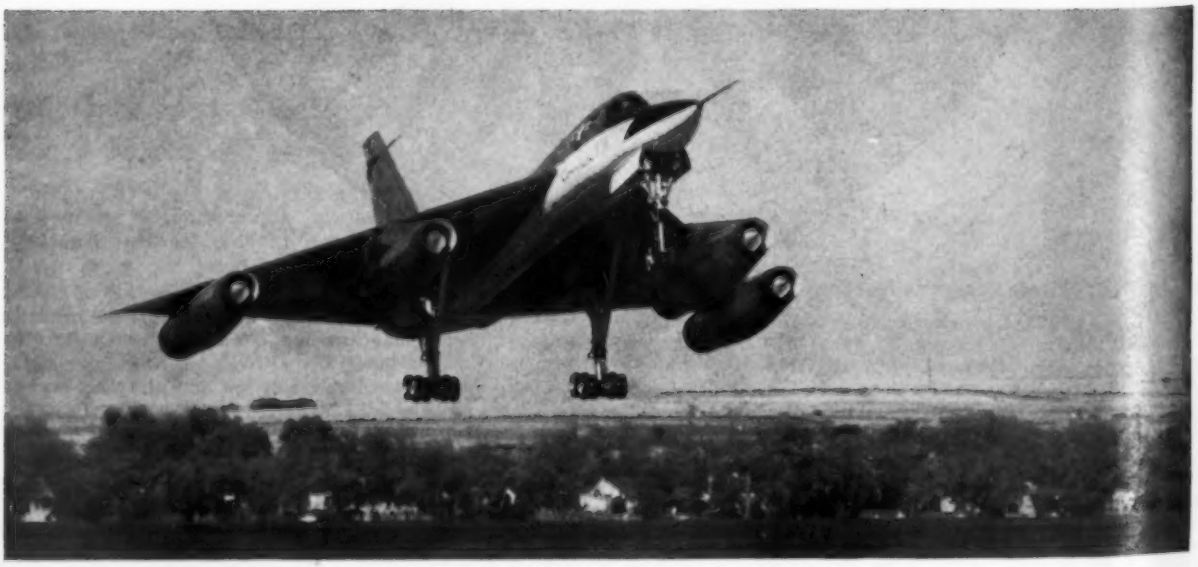
Convair B-58 Hustler: U.S.' First Supersonic Medium Bomber

First flight photos of Convair's B-58 Hustler show the USAF experimental supersonic bomber in various flight stages. Hustler carries a three-man crew, is 95 feet long and 30 feet high at tail, has a wingspan of 55 feet. Air Force contract calls for a "service" quantity of B-58s, presumed to represent about 12 aircraft.

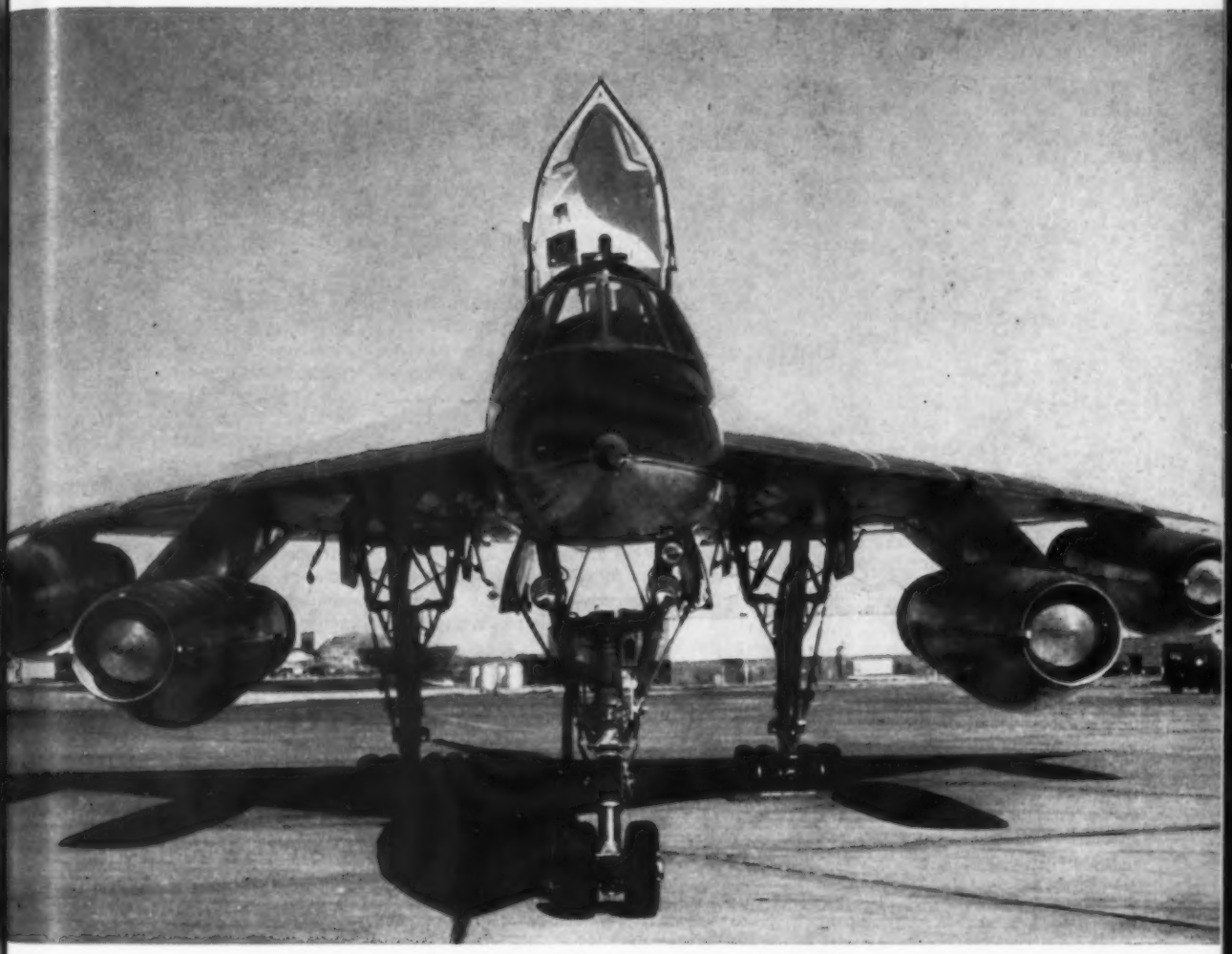
Area rule design is evident in underside view of B-58 in climb.



Long, sleek lines of Hustler confirm external carriage of bomb load.



B-58 on final approach displays massive main gear with 16 wheels.



Head-on view emphasizes B-58's stilt-like gear, varied suspension of engines.

Hustler takes off, powered by four General Electric J79s with afterburners.

Outgoing CAB Members Get Rough Deal

By WILLIAM V. HENZEY

Take it from at least three ex-Members of the Civil Aeronautics Board, there is considerable room for improvement in the handling of expiring Board Memberships. And take it from countless would-be Board Members, the process by which new Members are selected could stand some immediate sharpening.

Aside from the wear and tear on the individuals so involved, the public and the industry regulated are shortchanged, if not adversely affected, by the annual go-around associated with changes in top CAB posts.

For two or three months each year the five-man Board operates with less than its full quota of Members. Many cases that are ready for immediate decision necessarily are deferred until a new Member is selected and is familiarized with the issues at stake. The alternative is for an applicant to lose a case on a 2-2 vote for want of a majority.

• **The Board Membership problem** is a delicate one in which responsibility for annual mishandling is divided. Since the President nominates Board Members, whether they be incumbents or new choices, much of the responsibility must be attributed to the White House.

But since every Board Membership involves an almost indescribable tug-of-war embracing the individuals involved, the airline industry, Congress, and the major political parties, the White House shouldn't get all the blame.

In recent years, three CAB Members have run the gauntlet of non-renewal—Oswald Ryan in 1954, Josh Lee in 1955, and Joseph P. Adams in 1956. Ryan learned in January, 1955 that he wouldn't be reappointed, weeks after his term expired. Lee and Adams were more fortunate. They learned in December of their last years.

Question of Propriety

The issue is not whether any of the three deserved renewal but whether the dignity of the individual jobs shouldn't call, at least, for dignified terminations. Instead, those three individuals, and others before them, have, for all practical purposes, been fired and left jobless after years of government service.

Ryan and Lee were not directly apprised of their terminations except as the White House named their successors. Adams was told in mid-December by the White House that he would not be reappointed.

In contrast, Cabinet and sub-Cabinet members are given, among other things, the privilege of submitting letters of resignation and of receiving public words of praise in return from the President.

Nebulous as such benefits may appear to be, they all enter the picture when individuals are considering a CAB post and have much to do with many competent would-be Board Members declining to serve. Once again, such activities are detrimental to the public and the industry regulated.

In Ryan's case, he had served on CAB for 16 years after being unceremoniously dropped. Josh Lee had 12 years of service on the Board following a six-year term as U.S. Senator from Oklahoma. Adams was CAB's senior member in point of service with six years when he was dropped.

• **From the viewpoint** of the individuals involved, the White House would seem to have gained prestige by a firm announcement to each individual at least six months before his term was up that he would not be renewed. That would give the individuals a chance to bow out gracefully, line up employment for the future, and escape the physical wear and tear associated with such episodes.

Adams confided to this reporter last month that it wouldn't do for a man with a heart condition to undergo a CAB membership renewal session.

Nevertheless, the White House also has a side. In the one case, six months' prior announcement could touch off a battle royal with Congress where influential members usually muster in support of an outgoing Board Member. In another, the individual Board Members put up such renewal fights that the White House itself usually isn't sure until the last month that it will not reappoint an incumbent.

Knotty Problem

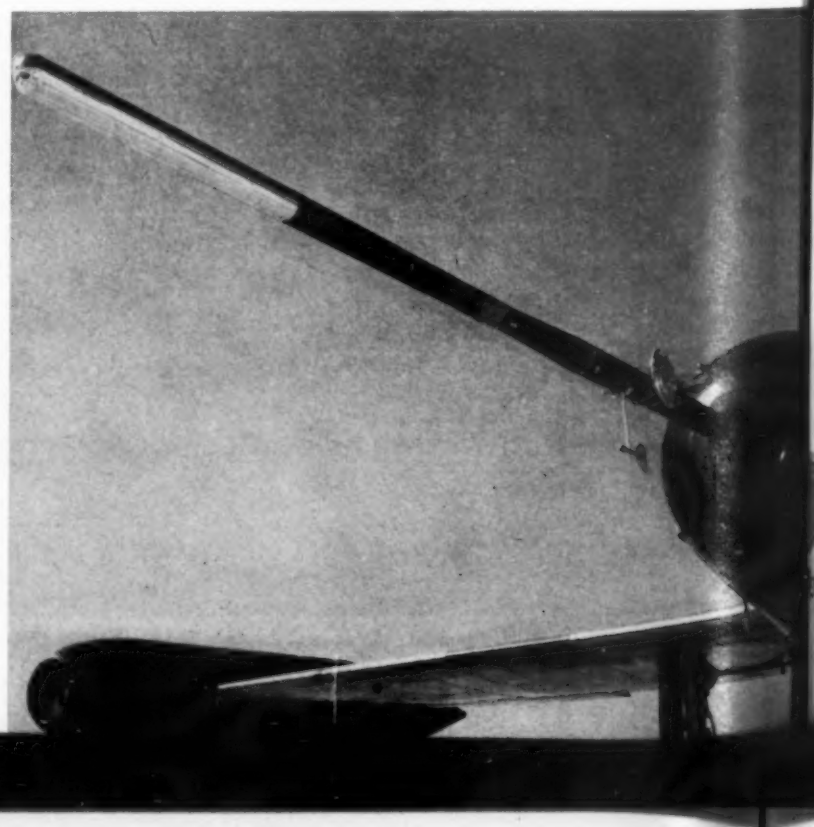
The problem may defy solution. But it would be a step in the right direction for the President to adopt a firm policy or for Congress to work out a legislative change requiring Presidential action on Board Memberships a reasonable time before actual expiration.

A secondary matter also enters the picture in such cases and it is noteworthy that CAB for years has encouraged legislation which would permit an incumbent whose term has expired to continue service until a duly appointed successor is sworn in. Such a move would minimize periods in which the agency otherwise operates with less than a full quota of Members and would appear to take the pressure off the President in naming a successor.

• **There is** still another problem which interferes with smooth functioning of the government's regulatory body for aviation. It involves the manner in which CAB Chairmen are selected. In

F-89 Probes Effect of Gusts on Low-Flying Jets

Northrop Aircraft has concluded first phase of an intensive AF study of effects of wind gusts on low-flying supersonic aircraft. Second phase is under way. Instrument-laden nose probe on converted F-89 records intensity and frequency of gusts in various terrain and weather conditions, psychological and physiological effect on crews, data for design of a terrain clearance indicator for jets.



Modification

Modification suggests alteration and manufacturing flexibility. Aircraft modification and flexibility are synonymous at Hayes. This applies both to facilities and personnel, due to the versatility of Hayes engineers.

The huge Hayes plant is divided into ten separate and independent bays — each embracing 116,000 square feet of an assembly line and working area. These are supported by conveniently located machine shops, wiring assembly lines and mammoth presses for structural shaping.

Add to these physical advantages the versatility of Hayes specialized engineering groups, and it becomes obvious why Hayes is able to meet tight delivery schedules simultaneously in the modification of many different types of aircraft.

TO ENGINEERS AND SCIENTISTS

The rapid growth and expansion of Hayes creates a continuing need for aeronautical scientists, aircraft design engineers and graduate engineering students, for which new opportunities open up almost daily. Hayes now has over 8,000 employees and is a competitive industrial facility for modification and maintenance of aircraft, including guided missile work. Write Personnel Department, P. O. Box 2287.

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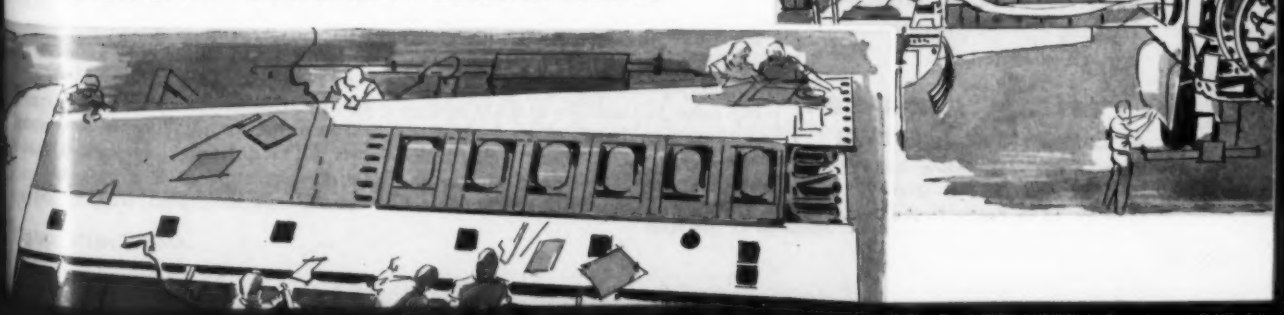


contrast with Board Members whose terms are for six years and whose nominations by the President must get Senate approval, the Chairman is designated each year by the President.

Some Chairmen Dictatorial

Raising the problem at this time is no reflection on CAB's present Chairman James R. Durfee. But over the years, there has been a tendency towards dictatorship on the part of some chairman with obvious adverse effect on the agency's quasi-judicial responsibilities. Petty jealousies have cropped up in the past when a particular Member has been overlooked for the spot he feels entitled to.

More serious, however, is the fact that some recent Chairmen have felt their activities should be in line with policies of the White House in contrast to their own personal views and in conflict with the intention of Congress when it framed the Civil Aeronautics Act in 1938.

In this regard, many past Board Members and some of those presently on the Board stress the desirability of a practice, such as enjoyed by the Interstate Commerce Commission, whereby the Chairmanship rotates annually, without regard to politics. ◆◆◆

Northeast Britannias on Assembly Line

These five partly-assembled aircraft are the Bristol Britannias ordered by Northeast Airlines for delivery in the fall. They are being built in Short. Bros. & Harland's Belfast plant. The aircraft in BOAC colors is a Mark 100 pre-production model which is being brought up to the fully modified airline standard.

AIA Reports Record Industry Sales

Record peacetime sales totaling $8.6 billion, registered in the face of a continually declining unit production, highlighted the U.S. aircraft industry's accomplishments during 1956, according to a year-end review of Air craft Industries Assn.

Total industry backlog near the year-end amounted to more than $18.3 billion compared to $15.7 billion on January 1, 1956. Military orders accounted for about $12.8 billion, commercial about $3.5 billion and mixed military/commercial another $2 billion.

Among other 1956 developments, AIA reported:

• Aircraft industry became nation's No. 1 commercial employer with an average employment of 800,000. Hourly earnings of aircraft workers increased from an average $2.17 in 1955 to $2.31 by September 1956.

• **Unit deliveries of military aircraft** totaled somewhat less than 7,000 compared with about 8,000 in 1955. However, heavier weight of 1956 aircraft, increased missile deliveries, continuing high rate of military R&D, plus commercial sales, brought total industry sales above 1955 level of $8.5 billion.

• Manufacturers sold a total of 7,500 civil aircraft, an increase of almost 2,700 over the previous year, with the bulk of the gain attributed to a jump from $63 million to $100 million in utility aircraft sales.

• Deliveries of commercial transports number 200, almost double the 113 delivered in 1955. Commercial backlog, meanwhile, increased from $2,311,000,000 on Jan. 1 to $3.5 billion by Sept. 30 as manufacturers took orders and options exceeding $1 billion for the second successive year.

AIA expects that total commercial and military sales in 1957 will again top $8.5 billion, although military unit deliveries will fall below 7,000. And although Congressional appropriations for airpower promise to insure moderately high production levels through calendar 1957 and beyond, the industry association expects a substantial change in the proportion of aircraft and missile orders.

By 1958, AIA estimates, procurement will be 65-to-35 in favor of manned aircraft over missiles, but as early as 1961 it is possible this ratio may change to 50-50.

Airlines Protest ODM Tax Writeoff Decision

The scheduled airlines have lodged a strong protest with the Office of Defense Mobilization against that agency's action in closing the goal of 900 commercial transport aircraft eligible for relief under the government's accelerated tax writeoff program.

Stuart G. Tipton, president of the Air Transport Association, said in a letter to ODM director Arthur Flemming that the industry is "deeply concerned" over ODM's decision. He asked that it be reconsidered.

Airlines have filed with ODM ap-

plications for tax amortization covering nearly 400 planes, including substantially all of the jets on order, Tipton said, adding that all these applications will be denied if ODM's decision stands.

ODM's policy statement of Dec. 26, 1956, said that "tax amortization will be granted only . . . where an expansion goal has been established and publicized because of a clear showing that, under conditions of full mobilization, the military and war-supporting requirements, plus the requirements of a rock-bottom civilian economy, would be in excess of the supplies available."

Tipton said this statement "is applicable without qualification to the air transport industry, and supports the continuation of the expansion goal for commercial aircraft."

CAA Safety Personnel To Get Jet Training

A team of approximately 30 Civil Aeronautics Administration aviation safety agents and flight test engineers are being scheduled for jet training under a cooperative Air Force-CAA program now taking shape.

Air Force has loaned CAA a Lockheed T-33 trainer and two F-80s to be used at its Oklahoma City aeronautical training center in conjunction with a Link jet trainer. CAA plan is to give the inspectors and engineers 30 hours' flight training in the jets and may extend this with additional time in two B-57s being used for airways tests.

Another phase of the program will send CAA mechanics to Sheppard AFB February 1 for training in jet maintenance.

Argentina Orders 90 Beechcraft T-34s

Argentina and Beech Aircraft Corp. signed a Beechcraft T-34 production agreement calling for approximately 90 of the military trainers and spares.

Production will extend into 1959 with option to continue beyond that date. First 15 planes will be built by Beech in Wichita, with deliveries starting this month. Remainder will be shipped disassembled to the government aircraft plant at Cordoba, Argentina, where they will be assembled with technical aid from Beech.

This is the first licensing and technical assistance agreement between a U.S. plane maker and the Argentine government since World War II, Beech said. It makes Argentina the seventh foreign country to acquire the T-34 and the third T-34 licensee abroad.

DC-8 fuselage nose section undergoes thermal evaluation tests.

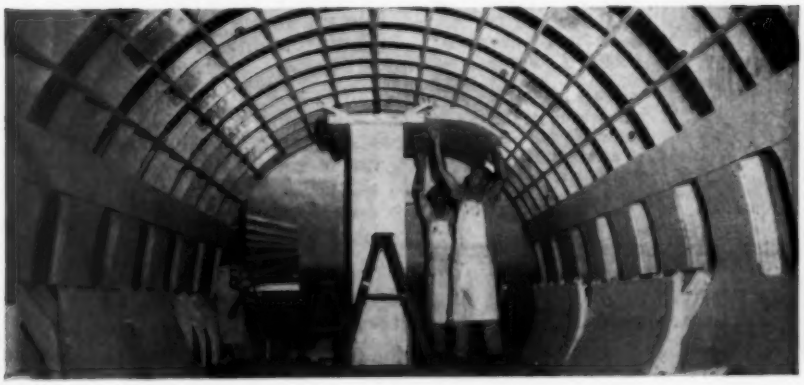
DC-8 Program Passes Halfway Mark at Douglas-Long Beach

With the March 14, 1958 first flight date for the Douglas DC-8 jet transport only 15 months away, Douglas-Long Beach division's construction program to meet this timetable has passed the half-way mark.

A structures assembly building is about 70% complete, with work progressing at a rapid pace. DC-8 final assembly facility is approximately 22% complete. Office buildings between the two main structures are one-third along in construction.

Biggest single DC-8 structural part so far received from an outside supplier is a 320-pound forging which will mate the jet transport's fuselage and wing. Other activities already underway at Long Beach include thermal evaluation tests on a fuselage nose section, fuel system anti-icing tests and research on engine noise reduction.

Large forgings, each weighing 320 lbs., will join jet's fuselage to wing.



Mockup fuselage cabanas will enable development of interiors to customer specifications.

Support fixtures take shape for wing lead and trailing edge development.

Top Hand in Logistical Support

For the assignments of today, the missions of tomorrow—Vertol aircraft are trump cards in the game with the highest stakes of all—our national defense.

- The Vertol HUP series: versatile and maneuverable, this helicopter performs in a whole spectrum of naval duties: rescue, liaison, sonar dunking and towing. Hundreds are now in service with the U. S., French and Canadian Navies.
- The Vertol H-21: the familiar "Workhorse" can transport 20 soldiers or 2¼ tons of cargo and land them almost anywhere. A versatile performer, it serves as a "flying crane", flying ambulance and assault transport.
- The Vertol H-16B: largest transport helicopter in the world, the Turbo Transporter will carry 69 troops at over 150 mph. It will revolutionize the art of logistics.
- The revolutionary aircraft now taking shape on Vertol drawing boards will blend the vertical landing and takeoff abilities of helicopters with the high speed performance of jets.

Outstanding job opportunities are available for engineers

VERTOL Aircraft Corporation

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Circle No. 13 on Reader Service Card.

Some Firms Solving Engineer Shortage By Recruiting Personnel Abroad

By CHARLES SCHAEFFER

A shortage of engineers continues to plague the aircraft industry. Colleges and universities are failing to meet the demand. And the stop-gap tactics of wooing qualified people from one company to another offers no lasting solution.

Some companies, searching for a way out, recently loosed recruiting experts to beat the bushes in Europe and Latin America. What they turned up is significant—in a limited way. General Electric, Republic Aviation, Minneapolis-Honeywell and the Martin Company, among others, report qualified success.

Generally, no company is prepared to hail global campaigns as the panacea to employment woes. Yet, in certain instances, the foreign engineer is a welcome addition to aviation research and production facilities.

Martin Co. 'Pleased'

The Martin Co., for example, is "very pleased" with 21 German engineers it signed up when the Peron government toppled in Argentina. The German experts became available after dictator Peron's aviation dreams evaporated along with his power. Some of them, engaged in aviation work in South America for as long as eight years, were developing a delta-wing aircraft at the time of Peron's downfall.

All have not reported, but those now working on non-classified projects are functioning well. Martin officials, as did spokesmen for other firms, stressed that foreign engineers employed here must immediately apply for U.S. citizenship.

Martin conceded that the overseas recruiting drives could conflict with the aims of certain aviation-conscious nations. Germany and Holland, for instance, are cool toward attempts to lure trained technicians from their native lands, observers report.

• **Republic Aviation Corp.** in recent years has recruited about 100 non-resident aliens. They have worked out well. But Republic maintains international recruiting is strictly a limited, specialized source of manpower.

R. L. Bortner, Republic's chief engineer-administration, summed it up as "costly, time-consuming and frustrating." "In specific instances it can be very rewarding," he said, "but Republic's efforts in this field have been confined to unquestionably qualified personnel."

Stiff requirements for a preliminary interview include five years of practicing experience, an engineering degree and a tough security check.

Republic's own below-the-border activities produced 50 interviews, based on these standards. Jobs were offered to 17, but only three have joined the staff and three or four others are weighing offers.

Most of the company's foreign engineers arrived from Western Europe via Canada. But even this route is peppered with obstacles. Involved immigration paper work and moving costs complicate efforts, Republic concludes.

An international group of engineers, awaiting U.S. citizenship, is now working on preliminary designs of aircraft powerplants at General Electric's Gas Turbine Division, Cincinnati. In most cases, their efforts are confined to engine designs with a relatively limited military future.

A noted member of this project staff is Dr. Guenther Diedrich, designer of the pulsejet engine used in World War II buzz bombs. Diedrich, a postwar German exile, is another expert left at loose ends by Peron's fall.

Other GE imports come from Denmark, Sweden, China, Austria, Persia, the Philippines and the Union of South Africa. The company will continue recruiting a limited number of engineers from outside the U.S. General Electric also dispatches interviewers to talk to persons who have queried the company. About 40 have been hired by these and other means.

The Aero Division of Minneapolis-Honeywell has employed a few directly from other nations, mostly Canadians. Some Chinese and other Far Easterners were hired as students here. Overall, it appears the company encountered more snags than advantages. Stumbling blocks listed by M-H include:

• Language barrier.

• Hampering of the NATO effort by skimming cream of scientific crop from Europe, thereby pushing it into a policy realm.

• Mountainous clerical work involved in immigration and clearance procedures.

• High costs of interviewing, recruiting and relocation expenses.

Nevertheless, plans for limited overseas' recruiting will stand. No immediate campaigns are slated, but special effort will be made to recruit high-caliber research and engineering personnel.

• **Bendix Aviation** is cool on the subject of global employment drives. None is planned, but the company does hire Canadian engineers, relatively free of security snarls. A steady flow of applications, prompted by technical journal advertising, reach the company's offices from abroad.

The Garrett Corp., which added 50 West German engineers to its AiResearch industrial division in 1956, declined to comment on the project. W. T. von der Nuell, the division's chief engineer, spent six weeks lining up prospects. No new plans for overseas' employment are in the mill. ◆◆◆

Fokker Improves Performance of F27

The zero-fuel weight of the Fokker F-27 Friendship has been increased to 32,210 lbs. while the maximum landing weight has been upped to 34,000 lbs. CAR landing field length remains at 3,000 ft. As the CAA flight test program has not been completed, Fokker is not yet able to announce the revised takeoff weight.

The Dutch company has revealed the availability of a version of the Friendship with the 1,700-shp Dart RDa7 engine that will bring the speed up to 311 mph. Estimated CAR takeoff field length at the increased takeoff weight of 35,520 lbs. will be the same as that for the RDa6-powered Friendship at the present takeoff weight of 34,520 lbs. Water-methanol injection, inherent in the RDa6-powered aircraft, will be eliminated in the RDa7-powered version.

Lockheed Plans to Make 5 New Models of C-130

Planning at Lockheed Aircraft Corp. for the future of its turboprop C-130 Hercules envisages quantity production for the next 10 to 15 years and no fewer than five new models of the aircraft, according to Carl Kotchian, v.p. and general manager.

In addition to the present C-130A, the Lockheed official named a ski-and-wheel version, a tanker-transport, photographic version, a command transport and the C-130B. Latter would be powered by Allison T56-A7 engines rated at 4,050 eshp, and a beefed-up landing gear which, combined, would allow a 10,000-pound increase in gross weight and improve overal performance.

Cessna 310 Wins USAF Light Twin Competition

Air Force Air Materiel Command has settled on Cessna Aircraft Co.'s Model 310 in preference to three other entries in its competition for a light twin-engine administrative liaison and cargo plane. AMC also announced plans to procure 80 of the five-place 310s at an estimated cost exceeding $5 million.

AF plan is to use the new aircraft to replace older World War II models which now demand considerable maintenance and upkeep. AMC officials indicated the less complex Model 310 will result in substantial savings in operating costs and will release a considerable number of trained mechanics for maintenance of first line combat aircraft.

Republic Unveils Weight-Saving Tandem Flight Control System

Republic Aviation Corp. has taken the wraps off a new tandem flight control system that eliminates 50 parts and saves 150 pounds on its F-84F fighter-bomber, yet gives it all the safety features of a dual control system installation.

The new development is a hydraulic-powered arrangement replacing the hydro-electric actuators in previous F-84Fs. Basically, it provides two completely independent systems, each with its own tank and plumbing, stategically dispersed throughout the aircraft for reduced vulnerability to battle damage.

The F-84F's one-piece horizontal tail (stabilator) and the ailerons are operated through new tandem control actuators made up of a dual servo valve and two power boost cylinders—all in one housing.

In normal operation, both boost cylinders provide power to each control surface. However, should one system be disabled in combat, the other takes over with no "feel" or effect on the pilot's control stick.

• **The new system** is now in production and is being fitted into current F-84Fs as well as RF-84F high-speed photo recon versions. However, its application is not confined to this series and the basic concept can be adapted to other aircraft types, Republic engineers say.

Presumably this would include Republic's first entry in the supersonic class, its F-105 fighter-bomber now undergoing tests at Air Force's Edwards AFB.

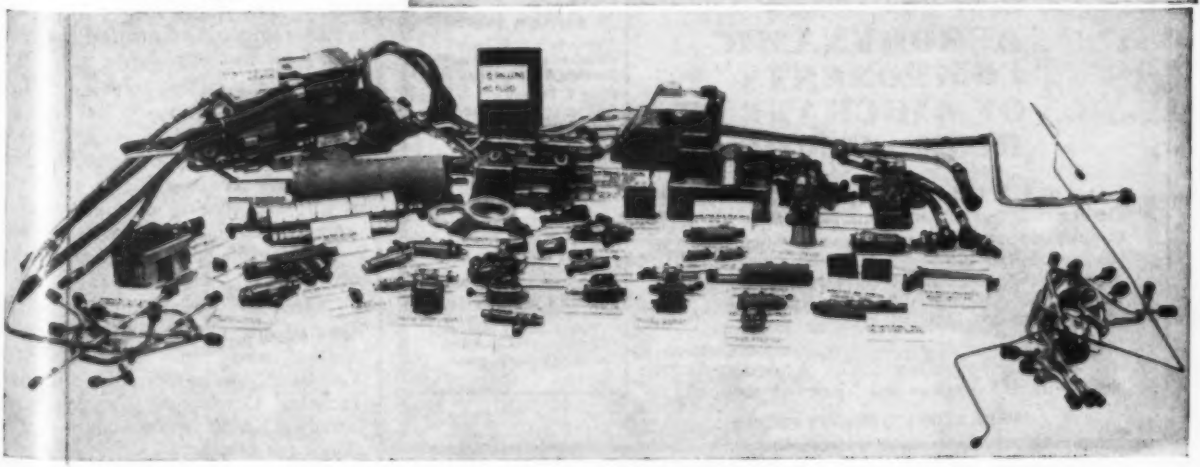
The tandem actuator development culminates a two-year program at Republic under Carl Parenti, head of its project and research engineering staff. Actual component production is being handled by two firms—Weba, Inc. of New Hyde Park, L. I. and National Water Lift Co. of Kalamazoo, Mich.—to Republic specifications.

• **Specifications** and final design of the system's dual servo valve are based on pressure and flow demands, compatible with F-84F flight characteristics, to furnish linear rate control. In essence, this means response in the control surface is proportionate to the rate of control movement by the pilot.

Also, the new actuator development provides almost double the previous hydraulic output through use of new high-capacity pumps developed by Dennison Engineering Corp. of Columbus, O. and New York Airbrake Corp. of Watertown, N. Y.

As a further backstop, a battery-driven, electro-hydraulic emergency power source is available in event of failure of the two engine-driven pumps. This emergency pump also may be used to augment hydraulic power in event of partial failure of engine pumps.

Final feature of the new system is the use of quick-disconnects designed for increased reliability and quicker maintenance. These were developed for Republic by Weba, Inc. and Fred Caley, an engineer of Norwalk, Conn.



Compact design of new Republic F-84F tandem actuator flight control system (right) is dramatically demonstrated in component layout comparison with earlier installation (below). New system saves 50 components, cuts weight by 130 pounds, says Republic, and can be adapted in concept to other aircraft types.

Southwest Airmotive Uses Noise Suppressors

Specially designed noise suppression equipment now is installed and operating at the Fort Worth jet test facility of Southwest Airmotive Co. Equipment was conceived by Industrial Acoustics and employs a simplified and relatively inexpensive installation consisting of intake baffles and mufflers.

Installed at a cost of about $60,000, the noise suppressors were ordered as part of an out-of-court settlement with nearby residents who filed noise damage suits last March.

The two mufflers are 28 ft. by 8 ft. in size. Installation together with SAC-

designed-and built augmentor tube required a 6-ft. extension to the end of concrete test cell building.

SAC officials said the equipment is designed to take larger capacity jet engines than the current J33 being tested for the Air Force with little or no adjustment.

New Test Silencer For Jet Aircraft

First installations of new-type ground test silencers for jet aircraft have been placed in service at Hughes Aircraft Co. in Culver City and at Norton Air Force Base, San Bernardino, Calif.

The prefabricated steel units are made by General Sound Control, Los Angeles, and come in kit form for quick installation and mobility. The manufacturer reports costs in the "$65,000 range," a big reduction from earlier models.

GSC attributes the ground test silencer's efficiency to a unique coaxial pattern of exhaust flow. A perforated diffuser in a cylindrical plenum chamber receives exhaust gases, shunts them back through lined bends. Exhaust finally is dissipated into the atmosphere through a vertical battery of "Acoustitubes."

Caster-mounted intake silencers roll into place over intake ducts. Additional shielding can transform a unit into a totally enclosed test cell. Internal water spray permits afterburner runups. GSC also is reported developing an airborne silencer for jets. Design incorporates new principle said to overcome added weight penalties.

New Test Stand Measures Jet Thrust Up to 30,000 Lbs. with Great Accuracy

A new high in precision and sensitivity in measuring jet engine thrust—producing accuracies within ± 0.5 percent in all load ranges up to 30,000 lbs. —is being achieved in a test stand operated by Thompson Products, Inc. for the Navy.

The new installation was developed and built by Baldwin-Lima-Hamilton Corp. at Perry, O., operated by Thompson as the Navy Industrial Reserve Aircraft Plant.

The test stand is designed to accommodate the largest aircraft engines (up to 30,000 pounds thrust) as well as small engines. The structure is about 10 ft. long, 8.5 ft. wide and 12 ft. high.

• **Engines under test** are supported in the stand at a height of 12 ft. above the base of the main frame by a secondary frame with vertical column supports that have flexure plates at top and bottom. These permit an imperceptible linear movement of the secondary frame necessary to get a proportional response from the electrical load sensing devices used for thrust measurement.

Thrust during tests is measured by means of two Baldwin SR-4 load cells between the two frames, 12 ft. above the base and on opposite sides of the test engine.

The cells take a compression load and are connected electrically to a direct-reading Baldwin indicator in an adjoining control room.

Each cell has two independent electrical circuits for measuring thrust. The second is provided either for standby use or for dual instrumentation, such as thrust recording with an oscillograph.

One feature of the test stand is a system for adjusting the location of the center of gravity of the combined test engine and stand. Adjustment is accomplished by means of 500-lb. weights, some 24 of which are suspended on the secondary frame to permit movement fore or aft, or complete removal, to adjust the location of the cg.

• **Two methods of calibration** are also available. In one system, with the test engine in place, the accuracy of load measurement by the SR-4 cells is checked against a precision cell which is connected to a SR-4 indicator.

In this arrangement, a special steel frame is used to apply loads on each cell from a hydraulic cylinder and pump. As loads are applied, readings are taken on both the calibrating indicator and the panel indicator. Also, hydraulic pressure readings can be taken for comparison.

In the other method of calibration, loads are applied in the same fashion as when the test engine operates—that is, through the secondary frame and flexures to the load cells. The test engine, however, is removed for this calibration and the loads applied by a hydraulic cylinder backed by steel cables attached to the walls.

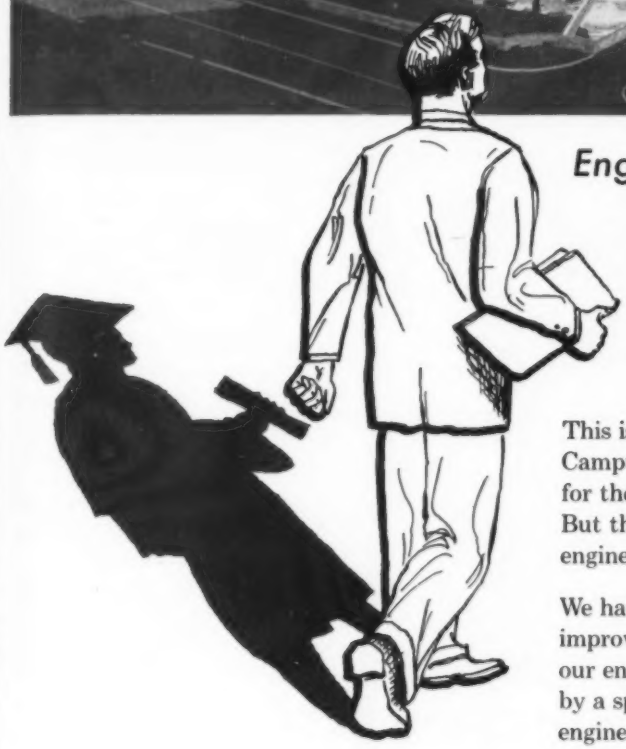
Load measurements are then measured either via hydraulic pressure in the cylinder or, if applied through the calibrating SR-4 cell, by the more precise SR-4 instruments.

Missile Firms Propose Anti-Collision Devices

Among the recent proposals put forth to air transport and government agencies for aircraft proximity warning systems there was strong evidence that missile engineering firms feel they have know-how to contribute.

This was evident in proposals from companies with missile sensing and guidance equipment experience. Eastern Kodak Co. and Nevada Air Products, which have been working on application of infra-red sensing of missile targets, proposed proximity systems using infra-red sensing for both detection and ranging.

Aerojet General, division of the General Tire Co., has also produced a proposal for an infra-red system. The Civil Aeronautics Administration's Technical Development Center plans to install a Kodak system on one of its planes for test.



Engineers Seeking —

continued professional development . . .

This is McDonnell's partially completed "Engineering Campus", where engineers will find an ideal atmosphere for their continued professional development. But these ultra-modern, completely equipped engineering facilities are only part of the picture.

We have a well planned, organized program for improving the professional status of each member of our engineering staff. This program includes counseling by a special staff of Career Analysts, and advanced engineering training in our complete in-plant training program or at one of our two local universities.

How about your own "professional development"? Engineers of all types are invited to investigate employment opportunities at MAC by writing:

RAYMOND F. KALETTA
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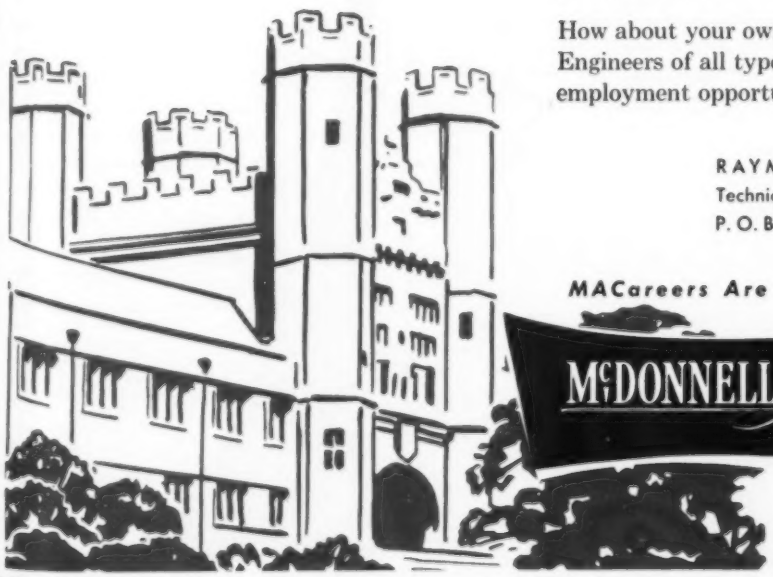

MACareers Are Successful Careers

McDONNELL Aircraft Corporation

Sam Saint Says . . .

We Need Volscan at Chicago

Volscan is a military "return to base" computer—in civil terminology, an approach control computer. In the Volscan system an aircraft radar target is tracked automatically and its position is fed to a computer. The computer computes and out come headings for the pilot.

The computer tells the controller by a dial; the controller relays to the pilot by voice. Later the computer will signal the pilot directly.

Flying these headings adjusts the length of the final flight track to bring Joe, the average pilot, over the fence on final within plus or minus five seconds of when the computer wants him there. (This is the writer's estimate of accuracy to be expected in civil operation.)

This Ouija board was widely publicized three years ago. The claim: 120 landings per hour. The announcement, complete with demonstrations and a color movie (there is an unclassified version) got little follow-up action from CAA and civil operators. Everyone "knew" that 120 landings per hour was not practical for the dignified DC-7, much less a Beech Bonanza—prop wash, no time to clear the runway etc.

SAINT

Civil operators, however, should have taken a closer look. The 120-per-hour figure, chosen for publicity releases, was based on traffic separations acceptable in a military emergency. Two important questions should have been asked: Is the method OK for civil use? And what landing rate will result when civil separation rules are applied?

• **Take the first question first:** *Is the procedure practical for civil use?* No point in taking your time if pilots or controllers won't buy it. Fortunately they will. Basically we are already using the Volscan procedure; only we do it manually. We work harder to move less traffic.

When the computer is installed the controller will still monitor by radar. Split-second decisions on timing will be made by the machine, leaving the controller fat and happy—like a pilot monitoring an automatically flown ILS approach.

The operation will be safer than the present manual system, especially for the pilot on a forgotten vector disappearing off the scope over Cos Cob, Conn.

As far as pilots and controllers are concerned, it appears that Volscan could be put to work at Chicago Midway airport as soon as the equipment could be installed. (Test of the first pre-production unit has just been completed at Clinton County AFB, Ohio. Delivery of two more units is expected soon.)

What will Volscan buy? Take a stop watch into LaGuardia tower (or any big tower) in the rush hours. You can convince yourself that runway time is wasted to the tune of 20-25% in the busiest hours of a clear Friday afternoon. The reason: Pilots can't position themselves with perfect intervals. They can't judge the speed of the aircraft ahead, nor can they judge distances accurately by visual perspective alone. At night, even with unlimited visibility, wasted runway time jumps to 35-40%. In instrument weather the best manual radar procedures waste 30-35%.

A Volscan computer can buy back this wasted runway time—15 more landings per hour in clear daylight; 25 more in moonlight; and 22 more per hour through a minimum ceiling. With runways retailing at a million dollars per thousand feet, these figures are important—something for planners to ponder as departing aircraft sit and sit and sit awaiting a break in a raggedly spaced parade of landing aircraft.

The Volscan computer is not the answer to everything. It is only a piece of the overall problem. But it is an important piece, one that will pay its way as soon as installed.

• **This gadget** with the military label *is a true Common System device.* With the knobs set for civil operation it can cut bad weather delays at major terminals. More important it can cut delays in clear weather. And it stands ready, at a moment's notice, to double its capacity in an emergency.

It's a safe bet the Air Force would make one available for test at Chicago, or maybe Washington. All government and civil agencies concerned agreed long ago to try Volscan at a civil location. Sure some questions remain, but none that couldn't be answered in a week.

So, why don't we have at it?

Four-speed actuator

AiResearch two-motored unit provides automatic control plus an instantaneous manual override at the work end of its Air Data System

During high-speed flight, where control is so delicate it is often by trim surfaces alone, immediate response under emergency conditions is of critical importance. The actuator shown allows immediate pilot override of the automatic system without any disconnect activity or mechanical clutching device. If necessary any one of four speeds may be instantaneously selected. The unit operates with complete dependability at ambient temperatures up to 300°F.

AiResearch actuators operate on split-field or permanent magnet DC motors, on AC servo motors or on single-phase, two-phase or three-phase AC motors. They can supply feedback signals to the control and be provided with neutral positioning and light-switches.

We are now engaged in the development of Air Data Systems of all types, assuming full system responsibility. Because we manufacture the entire system, including transducers, computers and actuators, you are assured of the utmost in system compatibility.

Outstanding opportunities for qualified engineers. Write for information.

THE GARRETT CORPORATION

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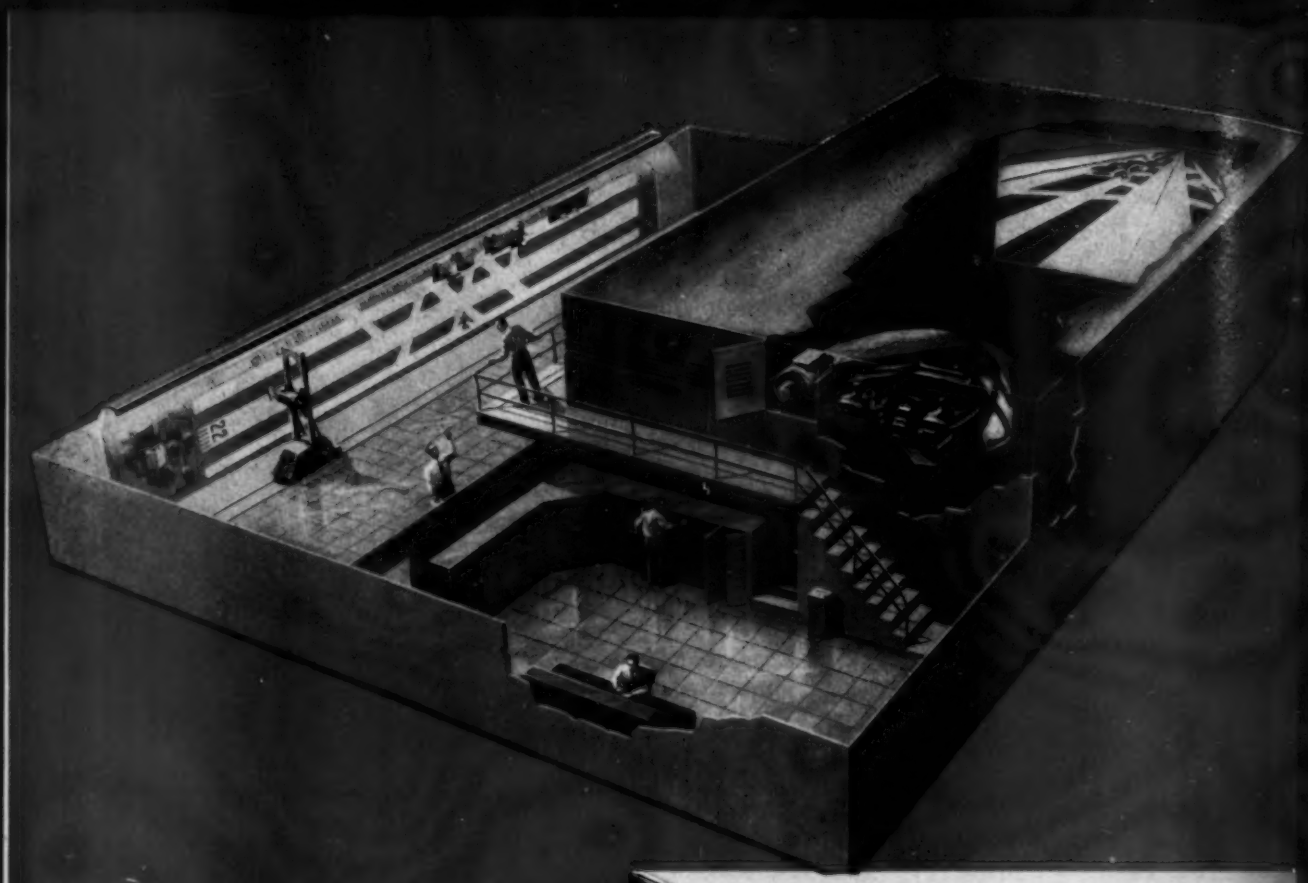
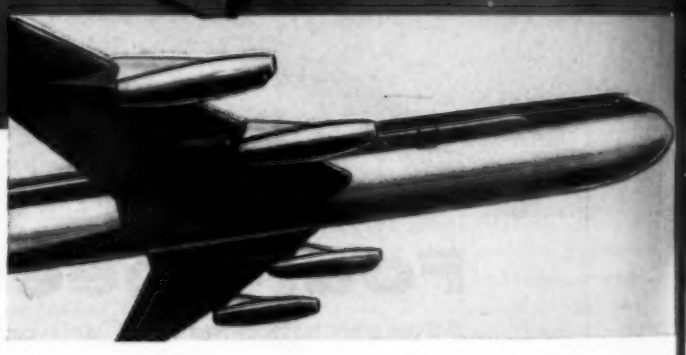


KLM
ROYAL DUTCH
AIRLINES

selects



LINK DC-8 *flight simulator*

To help train pilots and crews in transoceanic jet flight, Link will build KLM-Royal Dutch Airline's DC-8 jet flight simulator.

Long before the first of these mighty four-jet Douglas transports is delivered, KLM's personnel will have already learned the "feel" of the plane. They will have trained in conditions precisely simulating actual flight, practicing crew coordination, radio procedures, navigation, landings, takeoffs and the handling of emergency conditions.

Keeping pace with progress in every field of aviation is the watchword at Link . . . where advanced electronic engineering is helping to make tomorrow's flight better and safer than ever before.

OTHER LINK DC-8 SIMULATOR USERS

UNITED AIR LINES

SAS

KLM ROYAL DUTCH AIRLINES

pilots will train in LINK Electra simulator

The world's first Electra simulator has been designed and developed by Link. Pilots and crews for KLM-Royal Dutch Airlines' new Lockheed Electra fleet will train in this advanced propjet simulator . . . just as the personnel slated to operate KLM's new DC-8's will get the feel of jet flight in a Link DC-8 simulator.

By reproducing the cockpit and precise flight performance of the Electra in exact detail, Link engineering will make it possible for KLM personnel to experience actual "flight" in the new propjet. Long before KLM receives delivery, pilots and crews will have practiced and learned all flight procedures: landings and takeoffs, crew coordination, radio techniques and especially emergency procedures.

Once again, Link scores a major contribution in aviation progress . . . helping to build better, safer flight through advanced electronics engineering.

Pioneer and World's Leading Producer of Flight Simulators

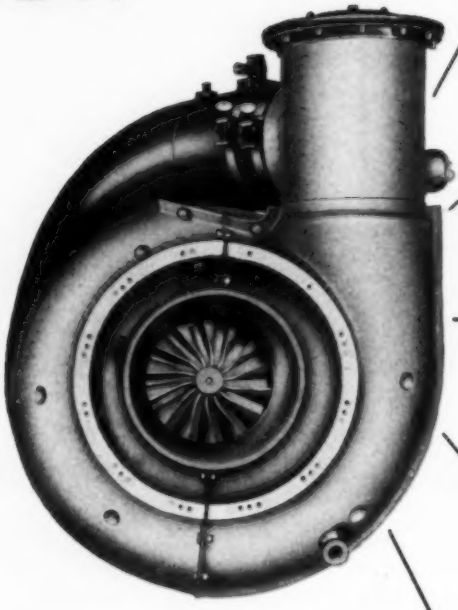
LINK AVIATION, INC.

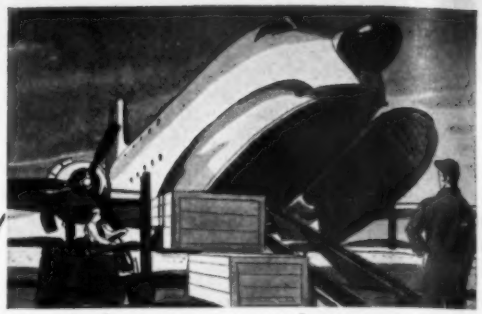
A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

BINGHAMTON, NEW YORK

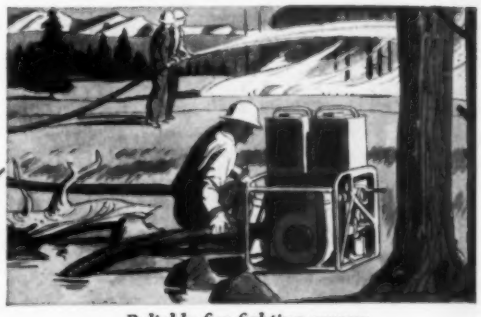
GPE

Mars* *is moving fast!*





Auxiliary power for ground, air operations



Reliable fire fighting pumps

Hydraulic checkout for aircraft

Guided missile ground support

Pod-mounted electric power supply

Mars engine has proven its worth in more than 15 applications.

Many new uses for the compact, reliable 50 hp Mars gas turbine have been developed in the last few years. Engineers welcome the high power-to-weight ratio of the Mars turbine, its fast starting under extreme temperatures, its easy maintenance, its sturdy dependability with infrequent overhauls. If you need a reliable 50 hp prime mover for pumps, auxiliary electric power or compressors, write Dept. C-121, Solar Aircraft Company, San Diego 12, Calif.

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*Mars is the registered trade mark of Solar Aircraft Company for its 50 hp gas turbine engine.

Circle No. 19 on Reader Service Card.

How U.S. Money Aids Foreign Airlines

By SELIG ALTSCHUL

Financing purchases of U.S. aircraft by foreign airlines is being actively facilitated by loans advanced by agencies of the U.S. Government along with private institutions here.

The Export-Import Bank of Washington (Eximbank), whose funds are supplied by the U.S. Treasury, has figured prominently in recent financing of foreign airline purchases in the American market. As revealed previously (AMERICAN AVIATION, December 17, 1956, p. 15), since 1945 the Eximbank has authorized more than $114 million in credits to assist overseas buyers in 11 countries in financing the purchase of U.S. civil air transports.

The International Bank for Reconstruction and Development (The World Bank) has also taken a hand in financing aircraft purchases in the United States. While international in character, The World Bank receives its largest individual support, financial and otherwise, from the United States.

Less publicized but a vital factor are the loans advanced by private U.S. financial institutions to facilitate acquisition of American-built aircraft.

Boon to Export Business

There can be no doubt that the Eximbank aircraft loans have been a boon to the industry's export business. This condition has also created the anomaly of placing new type transports in the service of foreign lines which will then be in a stronger position to intensify competition with U.S. airlines for traffic over the same routes.

On the other hand, the leading argument of the foreign lines in seeking financial assistance from U.S. supported agencies is that the new equipment thus acquired will permit them to increase passenger services so that badly needed dollar balances may be earned. As an official of the State Department declared not so long ago in reviewing American aircraft exports, "International trade is a two-way street . . . One way in which foreign countries can earn dollars is through their own airline operations to the United States . . . The large stake of the aviation equipment industry in foreign trade is convincing proof of the need for the U.S. to maintain a foreign trade policy that will permit other countries to continue to buy our products . . ."

• **The Eximbank loans** on aircraft purchases have been and will no doubt continue as a significant factor in the acquisition of equipment in the U.S. market by foreign airlines. The accompanying table reveals the current aircraft loans authorized by this agency through June 30, 1956. Since that time, a number of other credits have been granted.

The more recent Eximbank loans include one to Varig Airlines of Brazil. This was in the amount of $3,950,000 and is to assist in the acquisition of two Constellations and spare parts from Lockheed. (Varig absorbed the operations of S. A. Empresa de Vicacao which received a $3,110,000 credit in 1953.)

Still another Brazilian airline, Panair do Brazil, S. A., in November 1956 obtained a $6.9 million Eximbank credit. This loan will facilitate the purchase of four DC-7Cs and spare parts from Douglas.

JAL Got Largest Credit

More recently, the largest aircraft credit of all, $24.2 million, was extended by the Eximbank. Japan Air Lines is the beneficiary in this instance. Of this amount, $7.7 million was to be applied toward the acquisition of four DC-7s priced at about $13.5 million. In addition, another $16.5 million is to be made available toward the purchase of four DC-8s valued at around $29 million. This was the first instance of jet transports being financed by the Eximbank.

The general pattern of Eximbank loans has been that the purchaser make a down payment of about 25% of the cost of equipment being acquired. The balance of 75% of the purchase price is financed by the Eximbank but 25% of the total purchase is with recourse to the exporter. In other words, the Eximbank finances about 50% of the total cost without recourse. Wherever possible and then loans are secured by the aircraft. In some cases, as for Panair do Brazil, these credits carry the guarantees of financial institutions of the country concerned.

The interest rates have ranged from 3½% to 5%. Most of these loans are to be repaid in monthly installments over a five-year period. (The Japan Air Lines credit on the jets has a seven-year maturity and is repayable semiannually.)

These Eximbank credits, in a

Export-Import Bank Aviation Loans to Foreign Operators

(To June 30, 1956)

CARRIER OR COUNTRY	PRODUCTS AND EXPORTER	NET CREDIT AUTHORIZED Date	Amount
S. A. Empresa de Viacao Rio Grandense (Brazil)	Aircraft and Spare Parts Lockheed Aircraft Corp.	10/30/53	$ 3,110,000
Servicos Aeros Cruzeiro da Sul (Brazil)	Aircraft and Spare Parts General Dynamics Corp.	5/25/54	1,945,000
Lineas Aereas Costarricenses S. A. (Costa Rica)	Aircraft and Spare Parts General Dynamics Corp.	11/26/54	675,000
Republic of Indonesia	Aircraft and Equipment	11/30/50	6,023,000
Republic of Indonesia	Aircraft and Equipment	5/17/56	7,500,000
Hubschrauber-Ventriebs, GMGH (Germany)	Helicopters and Spare Parts Bell Aircraft Corp.	12/ 8/55	124,000
Government of Italy	Aircraft and Spare Parts	6/12/52	3,540,375
Aerolinee Italiane Internazionali (Italy)	Aircraft and Spare Parts	11/10/55	6,355,000
Transportes Aerreos Portugeses (Portugal)	Aircraft and Spare Parts Lockheed Aircraft Corp.	6/ 3/54	1,931,000
Imperial Ethiopian Government	Aviation Facilities	9/19/55	24,000,000

SOURCE: Export-Import Bank of Washington; Report to Congress—June 1956.

broader sense, represent an extension of the liberal policy this government has consistently shown in assisting other foreign airlines in becoming established. In the postwar period, first the Economic Cooperation Administration and later the Foreign Operations Administration made various grants for Aircraft, Engines, and Parts.

From April 3, 1948 to May 31, 1954 the total amount of such aid amounted to $108.6 million. France alone received $60.4 million of this amount. Such grants were of great value to dollar-starved countries in need of equipment to re-establish their air services and, of course, of great help to U.S. aircraft builders as well.

The World Bank has also played a vital part in financing aircraft purchases in the United States. Recently, it granted a credit of $9,230,000 to the Commonwealth of Australia to be used by that country's Qantas Empire Airways, Ltd. U.S. institutional investors have also agreed to advance $17,770,000 to Qantas.

This $27 million will be used to help finance the purchase of four Super Constellations and seven jet 707s. The entire loan will bear an interest rate of 4¾% and will mature semiannually from June 1964 to December 1966 for the World Bank after the scheduled retirement of the institutional loans.

The World Bank is no stranger to airline financing. In 1947 it granted France a $250 million reconstruction and development loan. Subsequently, the Bank noted that this loan financed part of the cost of nine new planes for Air France's Paris-New York service.

• **Probably the first** direct aircraft loan and one with a highly satisfactory experience made by the World Bank was to KLM in 1952. This was in the amount of $7 million with the Chase National Bank participating in one-half of the loan. This credit was guaranteed by the Netherlands Government and secured by six Super Constellations. The debt was to be amortized over a six and one-half year period.

Subsequently, late in 1954, this loan, then reduced to $5.6 million, was refinanced with the National City Bank, in effect, assuming the World Bank's participation in sharing the credit with the Chase. In this refinancing, the loan was unsecured by any aircraft and carried no guarantee of the Netherlands Government.

Last year KLM demonstrated its prime credit status when it was granted a $50 million credit by the First National City Bank, The Chase Manhattan Bank, and the Bank of America. This credit is unsecured and is without any guarantee of the Netherlands Government and has been obtained on a favorable basis at a relatively low interest cost. The credit, not yet drawn upon, will be added to KLM's corporate funds to assist in its equipment program.

The ability of KLM to obtain a large credit in the private U.S. capital markets is not only a tribute to that airline's strong financial position but to the soundness of international air transportation.

Nevertheless, the Eximbank, the World Bank and other institutions may be required to assist the equipment purchases of other foreign airlines until their credit status is firmly established.

AAP to Fulfill Aero Digest Subscriptions

American Aviation Publications will fulfill current subscriptions of *Aero Digest*, nation's oldest aviation magazine, which ceased publication with its December issue.

Digest subscribers are offered a choice of either AMERICAN AVIATION or MISSILES & ROCKETS magazine. If there is duplication of subscriptions, subscribers will be given equivalent credit for the AAP publication of their choice.

Management of *Aero Digest* said increased costs of operation and reduced advertising revenue caused suspension of publication.

Vickers Servo Pump Systems

Provide rapid and accurate response to minute electrical or mechanical signals

The Vickers Servo Pump Unit shown at the right is a signal-controlled, variable delivery, positive displacement, reversible flow oil hydraulic pump. In combination with a rotary or linear hydraulic motor, it forms a signal-controlled hydraulic transmission for remote control operations and high-response servo systems.

The servo transmission may be considered as a power amplifier when viewed from the electrical signal input, of about five watts, to the mechanical power output of several thousand watts. Various sizes of transmissions have been built, having output capacity ratings from one to four hundred horsepower. The servo pump develops only that pressure required to move the load . . . which means reduced pressure over the greater part of the system life since peak loads occur only infrequently in the majority of systems. This greatly reduces power losses and minimizes heat rejection.

Any type of prime mover of sufficient capacity can be used to furnish the power input . . . electric motor, auxiliary drive pad on an airplane engine, air turbine, hydraulic motor, etc. Substantially constant speed is desirable.

Variable Pump Volume Controlled by Signal

Heart of the servo pump unit is the Vickers Variable Stroke Hydraulic Pump. This is usually a nine-cylinder pump housed in a pintle-mounted yoke. Varying the yoke angle varies piston stroke, hence, output volume from zero to maximum in either direction of flow. A stroking piston actuated by a pilot valve varies the yoke angle according to signal.

Low Control Power Requirement

Power for control purposes is low in a servo pump unit because metering valve action is confined to the volume-regulating system which is a low power level (100 to 300 psi) hydraulic system separate from the power transmission hydraulic circuit although a part of the pump unit. This volume-regulating system controls piston displacement and direction in the power pump which can operate at pressures up to 3000 or 4000 psi. Pressure drop across ports of a metering valve, with its inherent losses, is avoided in the power transmission system. Final power output from the pump is determined by the volume of flow which the volume-regulating system demands and by the actual resistance of the load . . . is not dependent upon pressure drop methods of control.

In a control system employing this servo pump, the variations in gain resulting from load change are negligible compared to those which may occur in a similar circuit controlled by a valve metering directly in the power line.

Constant Displacement Hydraulic Motor

Flow and pressure generated in the hydraulic pump are carried by tubing with no intermediate valving to the hydraulic motor or linear actuator. The fixed stroke hydraulic motor provides torque directly proportional to pressure and speed directly proportional to flow rate.

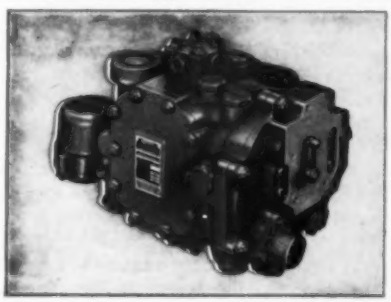
High Power-to-Weight Ratio

The servo pump unit and its associated hydraulic motor are designed for high power-to-weight ratio, high torque-to-inertia ratio, low inertia of rotating parts, and high resonant frequency.

Typical Example

High power-to-weight ratio—3.76 hp/lb (motor only)
High torque²-to-inertia ratio—3.5 x 10^7 lb-in./sec²
Low inertia of rotating parts— .052 lb-in.²
High resonant frequency— 20 cps (entire system)

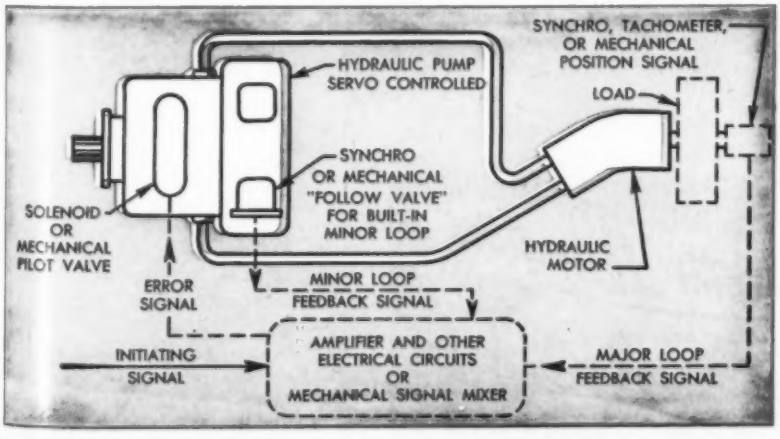
Other advantages are reliability and versatility of application. The smooth,



stepless speed changes and ability to hold position against any variation in load are additional reasons why this unit is a desirable resource which can solve many design problems.

Important among the applications of Vickers Servo Pump Units is extremely fast and accurate positioning of gun turrets on aircraft. Another is actuation of the exhaust nozzle for jet engines; here the servo pump's characteristic of providing at all times only sufficient power to meet the momentary demand minimizes the power loss and therefore the heat rejection. The greatly reduced average pressure level in this type of system prolongs the life and improves the reliability of all components.

For further information, ask for Bulletins SE-15 and SE-18 or get in touch with your nearest Vickers Aircraft Application Engineer. He can arrange for an engineering team to consider your problem and propose an optimum solution.



SIMPLIFIED DIAGRAM illustrates a servo control system employing Vickers Servo Pump Unit and Constant Displacement Hydraulic Motor. This system accepts initiating signals (either electronic or mechanical, depending on type of system), compares them with feedback signals from load and (through controlled changes in direction and volume of fluid pumped to motor) corrects the load as required. For added accuracy and stability, a minor loop providing signals proportional to rate of flow may be added. This may either be built into the pump in the form of a mechanical "follow valve" which results in modulating the flow as a function of the net signal to the pump, or may be a synchro which feeds a signal proportional to flow rate into the amplifier. The controlled output may be either a function of the position or velocity of the load.

Structural Tests on IGY Satellite Near

By HENRY P. STEIER

An advanced design version of a scientifically instrumented IGY satellite has reached the stage where structural tests are about to begin.

Prototypes of the latest satellite design are being readied for tests in the workshops of the Naval Research Laboratory in Washington, D. C. They go considerably beyond the "minimum-design" electronics of the simple Minitrack radio transmitter originally discussed for carriage in the satellites (AMERICAN AVIATION, April 9, 1956, p. 38).

The latest model includes provision for both the Minitrack system and telemetry coding, modulation, switching and transmission.

• **Engineers at NRL** have adopted a modularized scheme that is expected to allow many different scientific experiments to get "on-board" different satellites without violating basic structural and electronic layouts built to withstand the expected environmental conditions.

A plug-in electronics system has been planned on a two-dimension module basis. Unlike most modularized systems that have three dimensions, the NRL electronics uses circular modules that may vary in thickness but not in diameter.

Plans at this time call for a basic system of internal satellite bracing that also acts as the support for antennas as well as for a centrally located housing for modularized circuitry.

The very thin wall of the satellite shell requires the bracing if deformation due to antenna stresses and weight of instrumentation is to be avoided.

The electronics housing is a gold-plated aluminum cylinder. Into it will be plugged a "capsule" formed of layers of modularized circuitry.

Full-scale mock-up of an IGY satellite is held by Dr. John P. Hagen, director of Project Vanguard. Internal bracing with tubular arms supports antennas and housing for electronics.

First Measurements

Different satellites will have different circuits for a planned series of scientific measurements. Exactly what these will be and their sequence has not been revealed to date.

However, the satellite prototype now being readied for mechanical and thermal tests at NRL has provision for solar aspect and Lyman-Alpha circuitry.

The solar aspect circuit will use solar cells to measure light levels on the "bright" and "dark" sides of the satellite sphere. The Lyman-Alpha gear would be an ion chamber for ultra-violet detection with peak sensitivity at the hydrogen Lyman-Alpha line at 1215.7 A°.

• **Sudden ionospheric disturbances** that cause such effects as radio fadeout are associated with solar flares. The hydrogen Lyman-Alpha line is the most prominent feature of the far ultra-violet solar spectrum, and varies with flare intensity.

The ion chamber would be filled with nitric oxide gas which would ionize upon exposure to light from the sun through a lithium fluoride window. The window would act as a filter for restricting transmission to wavelengths under measurement.

Since the position of the satellite sphere with respect to the sun would be needed to determine direction from which ultra-violet light was received, the solar aspect measurement would be important.

Such a system operating for days would do what hundreds of short-term rocket tests could not do. However, there is still a time restriction.

• **Telemetry stations** are to be located only along one meridian. This is in the Western Hemisphere. Instrumentation must therefore include storage for Lyman-Alpha information.

During one revolution of the satellite about the earth, the peak Lyman-Alpha chamber output would be re-

corded. Magnetic cores would be used for storage. Information would be supplied to the cores from a Lyman-Alpha current amplifier.

Once during each satellite orbit on transition from light to dark, the solar cells would cause a reset of the storage unit. Also, they would give information on the "roll period" of the satellite.

The complete system was developed by Dr. Herbert Friedman who heads the Scientific Instrumentation Group at NRL. He has designed it so that when the satellite passes over a Minitrack station the telemetering circuit in the satellite would be turned on.

The ion chamber signal would then be transmitted on one channel and solar aspect information on another.

For storage switching, amplification and telemetry coding, modularized printed wiring boards carrying transistors and other components will be mounted layer-on-layer together with the Minitrack transmitter and battery power supplies.

Windows on Equator

Windows for measuring instruments are placed around the satellite equator. The solar aspect windows are 180 degrees from the Lyman-Alpha windows and the satellite dipoles are at 45 degrees to both types of window.

This arrangement should aid in knowing the relationship of the four ¼-wave dipole antennas with respect to the earth. Such information could be of aid in accumulating information pertaining to predictable and variable factors in upper atmosphere ionization.

Ionization effects are expected to influence Minitrack tracking measurements which are so important to helping camera trackers around the world find the tiny ball.

Telemetering and guided missile scientists everywhere admit that scientific chaos exists concerning information on wave propagation in highly ionized atmospheres around objects moving at hypersonic speeds.

Any information on the indices of microwave refraction under such conditions would be the beginning of an information breakthrough.

The dipole antennas fastened to the satellite will be folded during flight of the Vanguard vehicle to orbital altitude. After release of the satellite from the third-stage rocket motor the antennas will move into an erect position.

This will be done with spring-loaded hinges. After erection a sleeve will spring into place over the hinge and prevent folding of the dipoles.

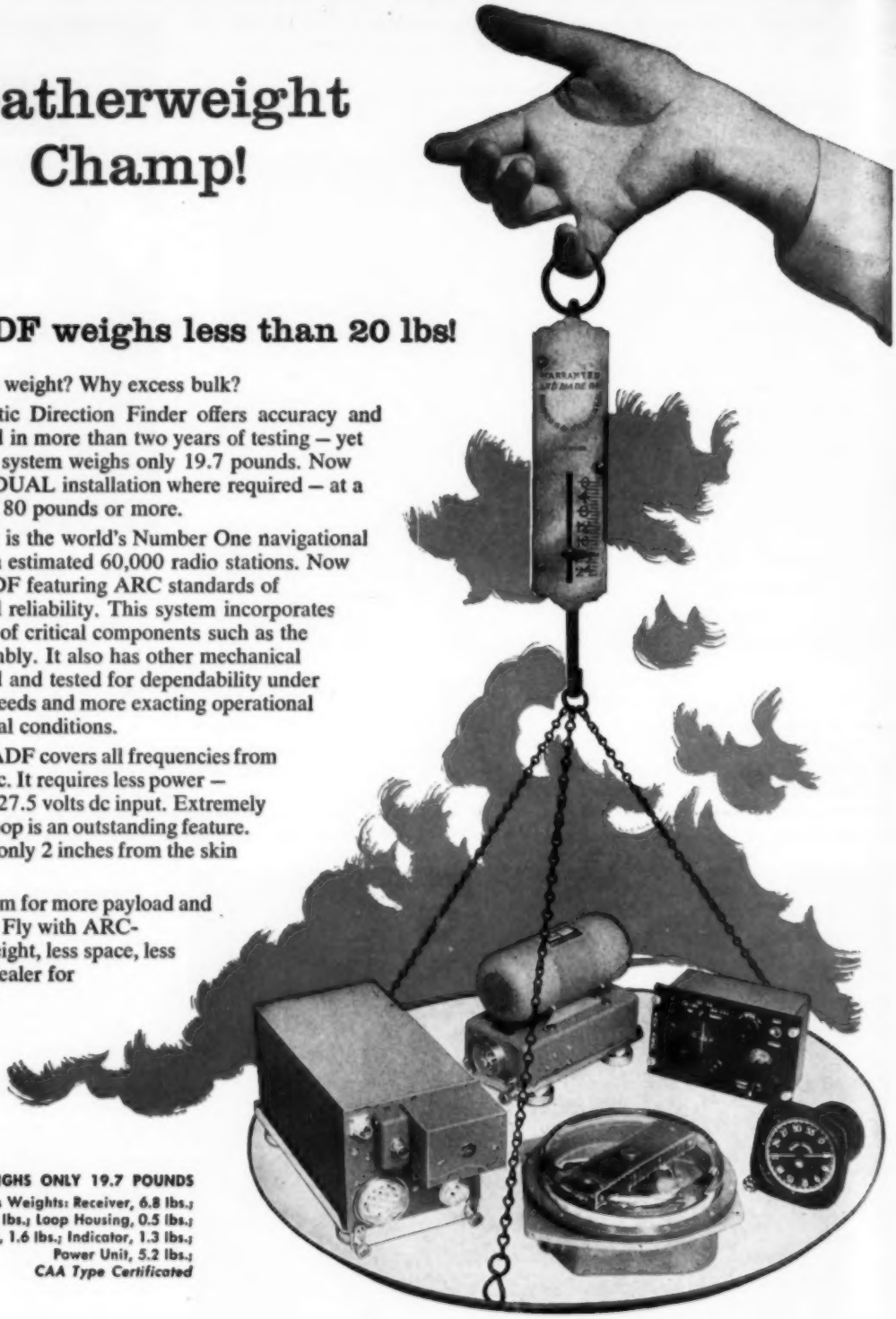
In the near future the prototype satellite design described will be subjected to thermocycling and centrifuge tests as well as pressure, vibration and shock tests.

After that the design will probably be given a flight test similar to the one given the Minitrack transmitter last month.

In that test using a Viking built for the Navy by the Martin Co., a Mini-

Plug in capsule held by Navy Research Laboratory's engineer Robert C. Baumann will contain layers of modularized satellite electronics circuitry. Central gold-plated aluminum cylinder will house capsule.

Featherweight Champ!



ARC's ADF weighs less than 20 lbs!

Why carry dead weight? Why excess bulk?

This Automatic Direction Finder offers accuracy and reliability proved in more than two years of testing – yet the entire 5-unit system weighs only 19.7 pounds. Now you can have a DUAL installation where required – at a weight saving of 80 pounds or more.

The ADF still is the world's Number One navigational aid, usable on an estimated 60,000 radio stations. Now you can have ADF featuring ARC standards of performance and reliability. This system incorporates hermetic sealing of critical components such as the entire loop assembly. It also has other mechanical features designed and tested for dependability under today's higher speeds and more exacting operational and environmental conditions.

The Type 21 ADF covers all frequencies from 190 kc to 1750 kc. It requires less power – only 2.8 amps at 27.5 volts dc input. Extremely low drag of the loop is an outstanding feature. Housing extends only 2 inches from the skin of the aircraft.

Now make room for more payload and other equipment. Fly with ARC-reliability, less weight, less space, less drag. Ask your dealer for complete details.

TYPE 21 ADF WEIGHS ONLY 19.7 POUNDS
Component Units Weights: Receiver, 6.8 lbs.; Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.; Control Unit, 1.6 lbs.; Indicator, 1.3 lbs.; Power Unit, 5.2 lbs.;
CAA Type Certificated

Dependable Airborne Electronic Equipment Since 1928

Aircraft Radio Corporation **BOONTON, NEW JERSEY**

Omni/ILS Receivers • Course Directors • UHF and VHF Receivers and Transmitters LF Receivers and Loop Direction Finders • 10-Channel Isolation Amplifiers • 8-Watt Audio Amplifiers • Interphone Amplifiers • Omnirange Signal Generators and Standard Course Checkers • 900-2100 Mc Signal Generators

Circle No. 23 on Reader Service Card.

track transmitter was ejected from the rocket at an altitude of 50 miles and tracked by Navy scientists stationed at the Air Force Missile Test Center at Patrick Air Force Base, Fla.

The Viking also carried telemetering equipment and tracking beacons similar to those planned for the satellite rockets. Among these was nose-cone telemetering gear for measurements of temperatures and pressures encountered.

Information will be released soon on the sequence of scientific measurements to be made with satellites by NRL. Some of the gear will require engineering strides in micro-miniaturization, data storage and telemetry know-how if scientists are to get everything they want out of the size-weight limited satellites. ◈ ◈ ◈

Aviation Automation Boom Is Forecast

A booming business in aircraft and missile automatic control systems and instruments, one that will reach a record $1.5 billion in 1957, has been forecast by Stephen F. Keating, v.p. of Minneapolis-Honeywell's Aeronautical Division.

Keating estimates that sales of such systems and other control devices, communications and navigation equipment, radio, radar and aircraft instruments will increase $100 million over 1956—double what it was five years ago.

He noted that many of the 12 large companies as well as smaller firms in the aircraft electronics and control field are reporting record backlogs, in some instances equal to one year's sales. In 1957, Keating predicts, the ability of these firms to produce in quantity and quality will govern their success, perhaps more so than in any postwar year.

IBM Machine to Predict Satellite Orbit

An International Business Machines 704 Data Processing Machine will calculate and predict the orbit of the satellite to be launched by Project Vanguard according to an announcement by the Navy Dept.

Dr. Paul Herget, Director of the Cincinnati Observatory, will head the staff of a Vanguard Computer Center to be set up in Washington, D.C.

The 704 will process data received and relayed by Minitrack radio tracking stations from the transmitter in the satellite.

Two angles of measurement and time of measurement will be sent to the Center twenty minutes after zenith passage of the satellite over each of nine tracking stations in the Western Hemisphere.

From the calculations, camera tracking stations throughout the world will be given time and elevation of passage, and angular velocity of the satellite over their positions beforehand to enable photographs to be taken.

An IBM Type 740 cathode ray tube output recorder will be used with the machine at the Center to display the satellite path over the earth.

The path and lines denoting passage times will be superimposed on maps of the regions having favorable observing conditions.

New GE Magnet Wins Science Citation

A new magnet made of iron particles smaller than particles in cigarette smoke probably will have applications as important as those that followed introduction of Alnico magnets in the past. General Electric Co.'s success in producing ultra-fine elongated iron particles smaller than the wavelength of light has created new possibilities for super-strong magnets of small size.

Magnet being examined here by Dr. T. O. Paine of GE's Instrument Dept. with a coil soldered to it is tapped for a screw.

Development was called "one of the major forward steps in industrial science in 1956" by Dr. A. T. Bonnell, Drexel Institute of Technology, in a citation given to GE by the American Association for the Advancement of Science.

Solid-State Physics Gains in Electronics

Reports on developments in solid-state physics indicate that rapid production in that field is growing, and its applications expanding.

Dr. William Shockley, director Shockley Semiconductor Laboratories, predicts that 13 million transistors will be produced in 1956, and that by 1965 transistors will catch up with tubes in production volume so that two billion of each will be produced. Shockley developed the transistor as a practical device while he was with the Bell Telephone Laboratories.

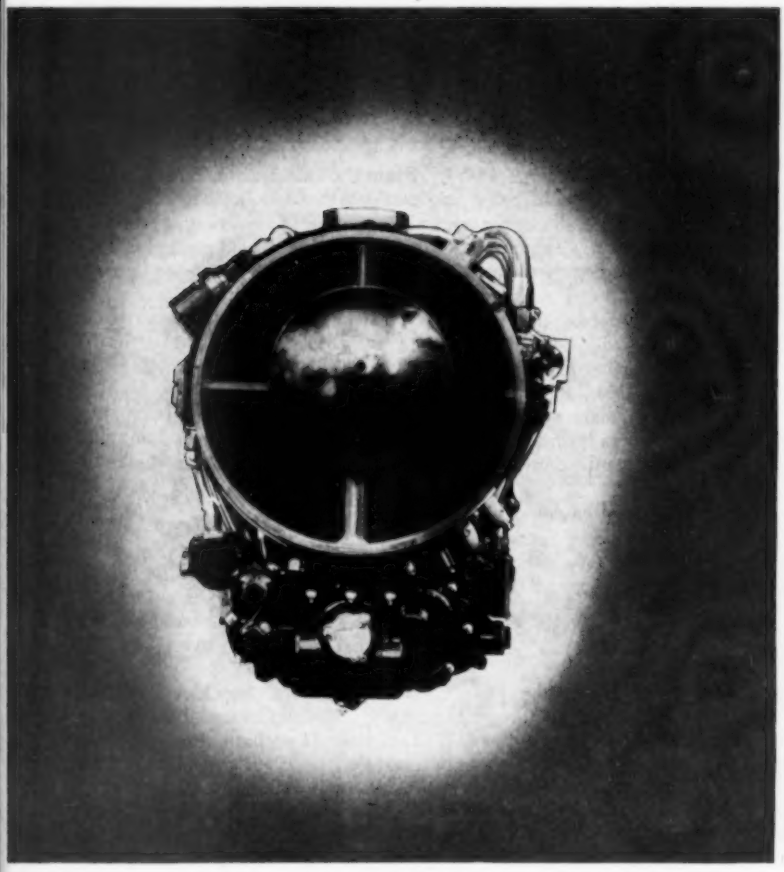
A new light sensitive semi-conductor described by Dr. J. T. Wallmark, Radio Corporation of America Laboratories, uses a transistor-like cell to detect the direction and intensity of light with an accuracy previously unknown.

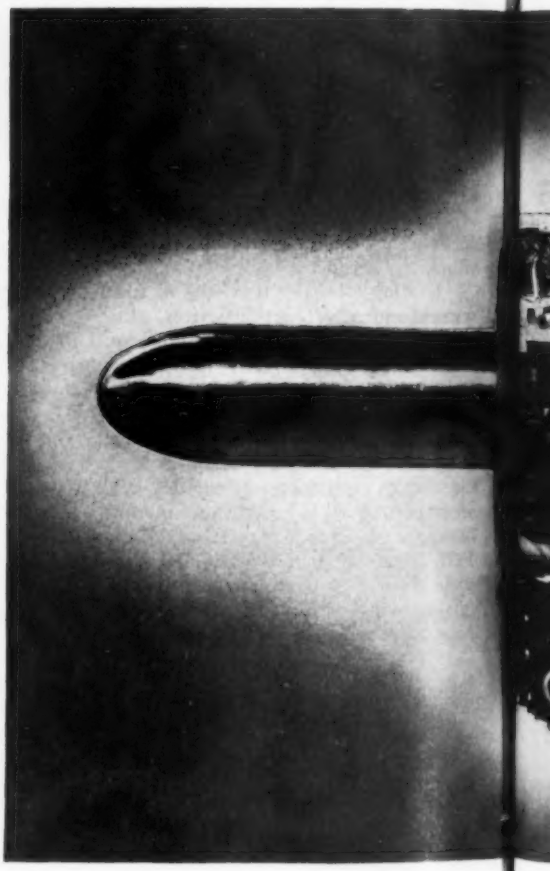
With a possible use for guiding missiles by using the center of the sun as a "fix," the new light cell can detect an angular movement of light smaller than 0.1 seconds of an arc, or 1/36,000th of a degree.

General Electric's New

1050 HP

Offers small aircraft economical gas turbine power . . .





A high-performance, axial-flow gas turbine, the T58 is designed to power helicopters, small transports, convertiplanes and other VTOL or STOL type aircraft into a new era of flight.

Now . . . gas turbine power economically tailored to the needs of small aircraft. From the T58's basic axial-flow design comes a new power-to-weight standard: 1050 horsepower from 250 pounds of engine! And the T58 makes this power available with a specific fuel consumption of 0.67 at normal rated power.

These features promise an era of flight marked by outstanding aircraft performance and operating efficiency. Yet they are but a few of the many advantages the T58 will offer wherever it flies. The T58 will operate on a variety of low-cost fuels, and its simplified construction will assure easy maintenance, installation flexibility, and long engine life.

Backed by the experience that created such famous aircraft gas turbines as the J47 and J79 turbojet engines, the T58 is the product of Navy vision and the engineering skill of General Electric's Small Aircraft Engine Department in Lynn, Mass.

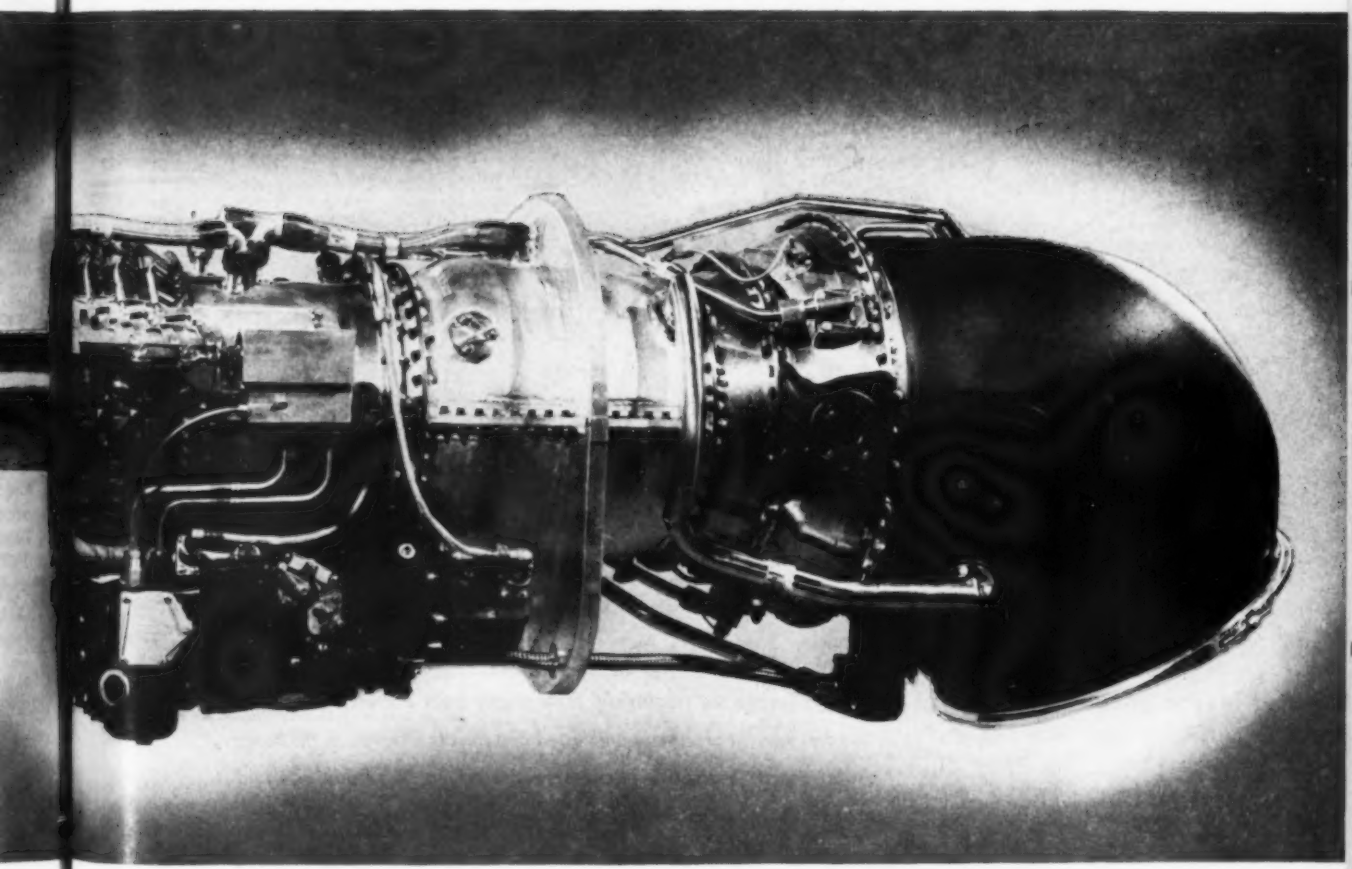
Find out what the T58's many features can mean to your aircraft. Call your local General Electric Aviation & Defense Industries Sales Office, or write: General Electric Co., Sect. 233–4, Schenectady, N. Y., for the T58 descriptive bulletin.

All figures based on engine without helicopter reduction gear. Gear weight: 75 lbs.

T58 Turboshaft Engine

0.67 SFC

new levels of performance and operating efficiency



Inside a shell 55 inches long by 16 inches in diameter at maximum flange, the T58 incorporates the most modern compressor design, straight-thru full-annular combustor, 2-stage axial-flow gas generator turbine, and single-stage free power turbine.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Circle No. 25 on Reader Service Card.

Observe the resourceful little prickly pear cactus. Tempting, green and juicy, it blossoms unmolested and thrives uneaten on the hungry, arid desert, because it has the good sense to be prickly first and succulent second. Some say you must eat or be eaten in this world. There is a third way to live. Keep some stickers showing and you, too, can take time to grow flowers. Republic makes a very efficient brand of stickers . . . they're called THUNDER-CRAFT.

REPUBLIC AVIATION

FARMINGDALE, LONG ISLAND, N. Y.

Designers and Builders of the Incomparable **THUNDER-CRAFT**

LATEST OFFICIAL FIGURES SHOW:

Directors Hold Only 5% of Industry Common Stock

An analysis of latest official information by AMERICAN AVIATION's research department of 22 aircraft manufacturing firms shows that common stock held by members of boards of directors of 13 companies came to less than 5% of all common stock outstanding.

This is significant in light of some misunderstanding resulting from House hearings last year on aircraft production costs and profits.

The hearings resulted in one of the most voluminous and informative public records ever compiled on the aircraft industry.

The House subcommittee, headed by Rep. F. Edward Hebert, however, did not compile individual stock holdings of key executives, since it was primarily interested in determining whether company profits were excessive.

The AMERICAN AVIATION analysis is based on data obtained from notices of annual meetings of stockholders and from information filed with the Securities and Exchange Commission in Washington.

As a service to the industry, and to prevent any misunderstanding in any future investigations of the industry, AMERICAN AVIATION presents for the record a breakdown of company executive stock holdings. Holdings of directors include shares owned by family members, family trusts, family foundations, certain corporations of which directors are top officers, and other shares over which directors hold voting control.

AVCO Manufacturing Corp.

Shares of common stock outstanding: 9,062,409 (Mar. 5, 1956).

Shares controlled by directors: 115,394 (Feb. 28, 1956).

V. Emanuel, president and chairman of the board, 26,000 common.

W. A. Mogensen, director, 3,000 common.

J. D. Shouse, vice president, 150 preferred, 4,050 common.

K. R. Wilson, Jr., vice president, 1,100 common.

G. E. Allen, attorney-at-law, 1,500 common.

I. B. Babcock, president, Aurora Corp. Dearborn Motors Credit Corp., Abrasive and Metal Products Co., 25 preferred, 4,897 common.

J. Bruce, director, National Dairy Products Corp., N. Y., 3,000 common.

M. W. Clement, director, Pennsylvania Railroad Co., 1,050 common.

C. C. Darling, president, New England Distillers, Inc., 3,000 common.

J. B. Hall, president, The Kroger Co., 500 common.

R. L. Johnson, president, Temple U., 300 common.

H. H. Kahn, partner, Lehman Bros., investment bankers, 1,000 common.

L. A. Lincoln, chairman of the board, Metropolitan Life Insurance Co., 100 common.

E. H. Litchfield, dean, Graduate School of Business Administration, Cornell U., 400 common.

J. A. McDougald, vice president, Taylor, McDougald & Co., Ltd., 1,000 common.

W. I. Myers, dean, N. Y. State College of Agriculture, Cornell U., 500 common.

B. H. Namm, chairman of the board and president, Namm-Loeser's, Inc., Brooklyn department store, 65 preferred, 1,912 common.

H. Oedekerk, chairman of the board, Hycon Mfg. Co., 37,370 common.

T. A. O'Hara, president, Union Electric Power Co., 235 preferred, 2,505 common.

E. R. Piore, vice president, 200 common.

R. S. Pruitt, director, 381 preferred, 21,920 common.

Beech Aircraft Corp.

Shares of common stock outstanding: 749,298 (Dec. 1, 1955).

Shares controlled by directors: 159,028 (Dec. 1, 1955).

A. O. Beech, president, 77,500[1].

J. P. Gaty, vice president and general manager, 6,750.

F. E. Hedrick, vice president, 3,312[2].

C. C. Pearson, vice president, 250.

D. S. Wallace, attorney-at-law, 4,937.

[1] Plus 8,505 in daughters' names, and 56,462 in family trust.

[2] Plus 1,312 in family names.

Bell Aircraft Corp.

Shares of common stock outstanding: 2,626,742 (Mar. 12, 1956).

Shares controlled by directors: 1,371,717[1] (Mar. 1, 1956).

L. D. Bell, president, 32,000.

L. P. Faneuf, vice president, 300.

R. P. Whitman, first vice president, 7,475.

J. E. Bierwirth, president, National Distillers Products Corp., none.

R. S. Elliot, Jr., executive vice president, The Equity Corp., N.Y.C.[2].

P. Hufty, chairman, Finance Committee, Northeastern Insurance Co. of Hartford, none.

E. C. Huntington, Jr., chairman of the board, The Equity Corp.[2].

A. F. Milton, chairman of the executive committee, The Equity Corp.[2].

G. Olmsted, chairman of the board, Hawkeye-Security Insurance Co., also vice chairman of the board, The Equity Corp.[2].

O. A. Pfaff, president, Wheelabrator Corp. (wholly-owned subsidiary), 7,176.

F. F. Robinson, president, National Aviaton Corp. none.

J. F. Schoellkopf, IV, president, Niagara Share Corp. 200.

C. S. Stuckenholt, president, The W. J. Shoenberger Co. (wholly-owned subsidiary). 350.

W. A. Yates, vice president, Spaulding-Yates, Inc., 3,950.

[1] Includes 1,320,266 shares owned beneficially by Equity General Corp., and represented by directors R. S. Elliot, Jr., E. C. Huntington, Jr., A. F. Milton and G. Olmsted.

[2] Equity General Corp., a wholly-owned subsidiary of The Equity Corp. (Equity), owned beneficially 1,320,266 shares of the Corporation's common stock, $1 par value, representing 50.26% of the shares then outstanding.

Boeing Airplane Co.

Shares of common stock outstanding: 3,257,985¼ (Jan. 31, 1956).

Shares controlled by directors: 32,353 (Jan. 31, 1956).

W. M. Allen, president, 7,828.

W. E. Beall, senior vice president, 2,089.

F. P. Laudan, vice president, 4,294

J. E. Schaefer, vice president and general manager of Wichita Div., 1,468.

E. C. Wells, vice president, 1,390.

J. O. Yeasting, vice president, 1,284.

D. Corbet, president, Smith Cannery Machines Co., Seattle. 300.

C. L. Egtvedt, chairman, 9,500.

D. A. Forward, senior vice president, First National City Bank of New York, 300.

A. L. Gates, business consultant, 300.

W. G. Reed, chairman, Simpson Timber Co., Seattle, 300.

D. Schmitz, president, Washington Mutual Savings Bank, Seattle, 3,000.

J. P. Weyerhaeuser, Jr., president, Weyerhaeuser Timber Co., Tacoma, 300.

Cessna Aircraft Co.

Shares of common stock outstanding: 731,109 (Nov. 7, 1955).

Shares controlled by directors: 79,050 (Nov. 7, 1955).

D. L. Wallace, president, 62,650[1].

F. A. Boettger, vice president and treasurer, 3,000.

D. L. Roskam, vice president, 4,500.

T. B. Salter, vice president, 2,000.

S. Coleman, president and general manager, The Coleman Co., Inc., 900.

G. McDonald, partner, McDonald, Tinker, Skaer, Quinn and Porter, 5,800.

R. C. Russell (nominee), investments, 200.

[1] Plus 12,234 owned by family.

Chance-Vought Aircraft, Inc.

Shares of common stock outstanding: 1,079,619 (Feb. 17, 1956).

Shares controlled by directors: 4,200 (Feb. 17, 1956).

C. J. McCarthy, chairman of the board, 800.

F. O. Detweiler, president, 1,600.

H. B. Sallada, executive vice president, 200.

N. V. Turney, vice president and controller, 300.

D. A. Hulcy, president and chairman of the board, Lone Star Gas Co., Dallas, 100.

L. F. McCollum, president, Continental Oil Co., Houston, 800.

W. W. Overton, Jr., chairman of the board, Texas Bank and Trust Co., Dallas, 100.

R. L. Tayloe, vice president, Sears Roebuck and Co., Dallas, 100.

J. R. Wood, president, Southwestern Life Insurance Co., 200.

Continental Motors Corp.

Shares of common stock outstanding: 3,300,000 (Jan. 15, 1956).

Shares controlled by directors: 69,354 (Jan. 15, 1956).

C. Reese, president, 16,500.

H. A. Todd, president of subsidiary, Wisconsin Motors Co., 100.

L. P. Kalb, technical advisor, none.

H. W. Vandeven, treasurer, 4,000.

J. H. Ferry, Jr., independent engineer, 48,154.

F. J. Kennedy, member of law firm of Butzel, Eaman, Long, Gust and Kennedy, 500.

D. Van Alstyne, Jr., partner in the firm of Van Alstyne,

Stock Holdings of Directors of Aircraft Manufacturing Companies

Company	Type of Stock	Shares Outstanding	Holdings of Directors	% of Outstanding Shares
Bell Aircraft Corp.	Common	2,626,742	1,371,717	52.2
McDonnell Aircraft Corp.	Common	720,000	268,683	37.3
Piper Aircraft Corp.	Common	843,064	295,576	35.1
	Preferred	46,424	17,069	36.8
Beech Aircraft Corp.	Common	749,298	159,028	21.2
Temco Aircraft Corp.	Common	1,676,835	279,865	16.7
Republic Aviation Corp.	Common	1,472,013	225,136	15.3
Grumman Aircraft Eng. Co.	Common	2,200,000	307,150	14.0
Ryan Aeronautical Co.	Capital	426,493	57,000	13.4
Cessna Aircraft Co.	Common	731,109	79,050	10.8
Fairchild Engine & Airplane Co.	Common	3,032,146	122,253	4.0
Lockheed Aircraft Corp.	Capital	2,830,504	102,145	3.6
General Dynamics Corp.	Common	5,011,658	133,393	2.7
Douglas Aircraft Co., Inc.	Capital	3,704,790	78,805	2.1
Continental Motors Corp.	Common	3,300,000	69,354	2.1
The Glenn L. Martin Co.	Capital	2,700,971	39,715	1.5
AVCO Manufacturing Corp.	Common	9,062,409	115,394	1.3
United Aircraft Corp.	Common	4,874,672	50,256	1.0
Boeing Airplane Co.	Capital	3,257,985¼	32,353	1.0
Northrop Aircraft, Inc.	Common	1,499,900	13,152	0.9
Curtiss-Wright Corp.	Common	7,042,116	51,000	0.7
	Class A	953,719	None listed	.....
Chance-Vought Aircraft, Inc.	Common	1,079,619	4,200	0.4
North American Aviation, Inc.	Common	3,435,033	7,850	0.2

Noel & Co., investment bankers, 100.

Curtiss-Wright Corp.

Shares of common stock outstanding: 7,042,116 (Feb. 24, 1956).
Shares of Class A stock outstanding: 953,719 (Feb. 24, 1956).
Shares of common stock controlled by directors: 51,000 (Feb. 17, 1956).
Shares of Class A stock controlled by directors: None reported.
R. T. Hurley, chairman of the board and president, 13,600.
G. R. Hill, vice president, 12,700.
E. J. Beinecke, chairman of the board, The Sperry and Hutchinson Co., advertising, 100.
T. R. Berner, lawyer and trustee, 12,200.
J. G. Byron, vice president and director of industrial relations, 1,200.
L. H. Campbell, Jr., chairman of the board, Automotive Safety Foundation, 100.
J. C. Cowdin, chairman, Ideal Chemical Products, Inc. 100.
L. R. Crandall, president, George A. Fuller Co., building construction, 500.
C. A. Dana, chairman of the board, Dana Corp., automotive manufacturing, 100.
R. W. Lea, vice president, Olin Mathieson Chemical Corp, 100.
S. R. Reed, spec. partner, Paine, Webber, Jackson and Curtis, New York brokers, 300.
L. H. Smith, president, Floyd H. Smith, Inc., oil and gas production, 9,000.
H. S. Sturgis, vice president, First National City Bank of N. Y., 1,000.

Douglas Aircraft Co., Inc.

Shares of capital stock outstanding: 3,704,790 (Mar. 9, 1956).
Shares controlled by directors: 78,805 (Mar. 9, 1956).
D. W. Douglas, president, 38,100.
F. W. Conant, senior vice president, 15,060.
A. E. Raymond, vice president, 13,200.
D. W. Douglas, Jr., vice president, 1,250.
N. Paschall, vice president, 2,295.
F. E. Hines, vice president, 2,000.
M. W. Bekins, president, Bekins Van and Storage Co., 600.
C. S. Jones, president, Richfield Oil Corp., none.
C. J. Lick, executive vice president, Pabst Brewing Co., 600.
G. Mayo, financial management counsel, none.
E. H. McLaughlin, president, Union Hardware and Metal Co., 1,200.
N. Petree, president, Barker Bros. Corp., 150.
H. W. Strangman, treasurer, none.
S. G. Welsh, member, New York Stock Exchange, 3,750.
D. Whiting, vice president, Alexander and Alexander, Inc., insurance brokers, 600.

Fairchild Engine and Airplane Corp.

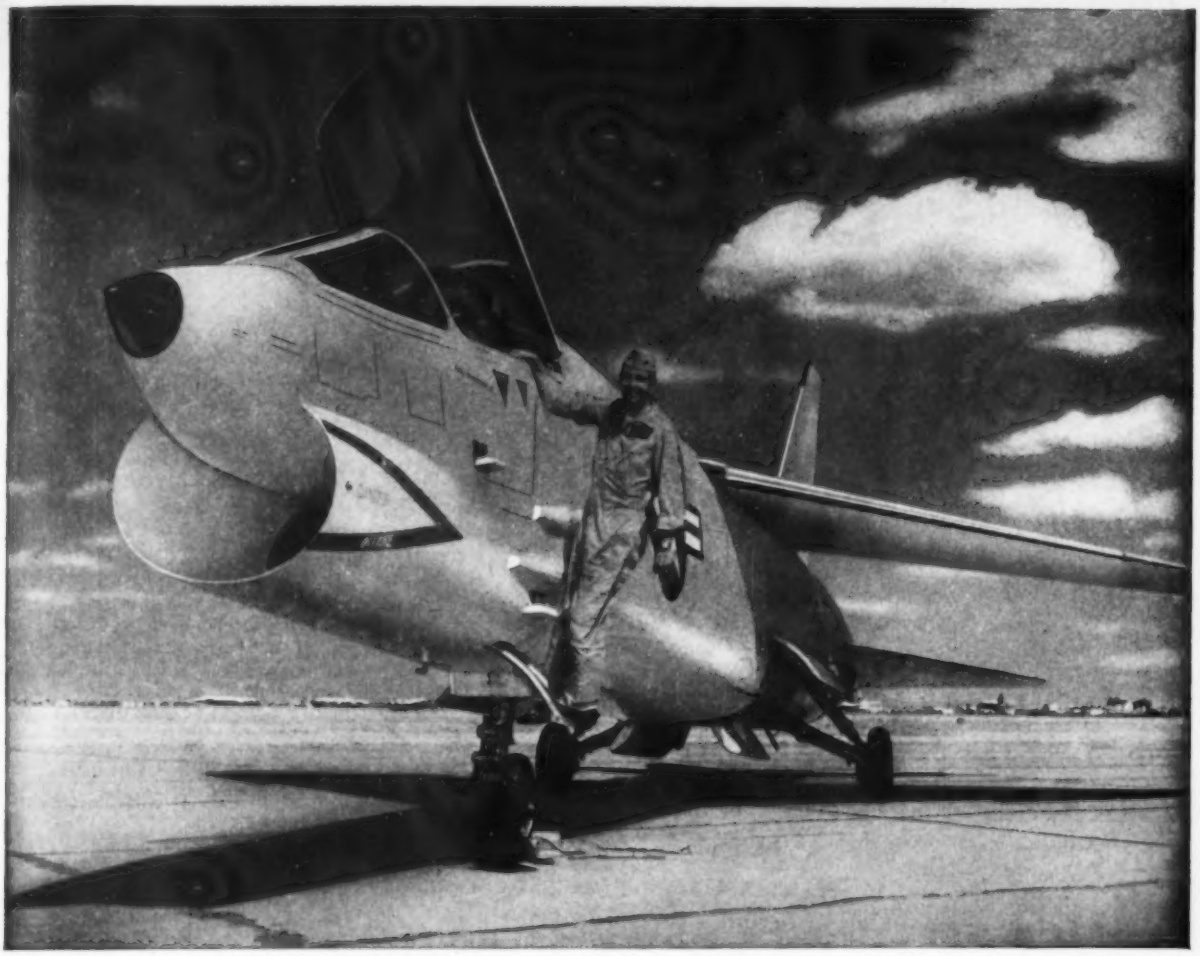
Shares of common stock outstanding: 3,032,146 (Feb. 15, 1956).
Shares controlled by directors: 122,253 (Feb. 15, 1956).
R. S. Boutelle, president, 1,313.
A. F. Flood, executive vice president and comptroller, 1,208.
J. A. Allis, chairman of the board, 2,600.
R. B. Carney, aviation, shipbuilding and transportation consultant, 105.
C. H. Colvin, director, Colvin Labs., Inc., 263.
E. Cook, consulting engineer, 105.
E. A. Eyre, management of private investments, 1,000.
S. M. Fairchild, chairman of the board, Fairchild Camera and Instrument Corp., 100,559.
W. P. Lane, Jr., president, The Herald-Mail Co., newspaper publishers, 1,600.
G. Loening, consulting engineer, 10,500.
F. R. Nichols, president, Nichols Wire and Aluminum Co., 3,000.

General Dynamics Corp.

Shares of common stock outstanding: 5,011,658 (Feb. 1, 1956).
Shares controlled by directors: 133,395[1] (Feb. 1, 1956).
J. J. Hopkins, president and chairman of the board, 58,328.
F. Pace, Jr., executive vice president, 9,000.
E. D. Johnson, senior vice president, none.
J. T. McNarney, senior vice president, 1,000.
J. G. Notman, president and general manager of Canadair, Ltd., 1,000.
L. B. Richardson, senior vice president, 4,730.
R. C. Tait, senior vice president, 4,455.
L. J. Gross, vice president, 4,534.
R. I. Harris, vice president and counsel, 4,174.
A. D. Marshall, vice president and secretary, 500.
J. V. Naish, executive vice president, 1,200.
R. B. Watts, vice president and general counsel, 1,748.
E. C. Alvord, lawyer, Alvord and Alvord, 1,070.
LaM. T. Cohu, chairman of the board, Kay Labs, 1,300.
I. M. Laddon, president, Langley Corp., 938.
H. M. Marx, lawyer, Kramer, Marx, Greenlee, Backus and McMahone, Inc., 402[2].
D. N. McDonnell, vice president, Blyth and Co., Inc., investment bankers, 114.
C. M. Miller, retired, 1,000.
F. C. Nash, lawyer, Nash, Ahern and Abell, none.
R. F. Windfohr, director, The Chicago Corp., Texas Pacific Coal and Oil Co., First National Bank of Fort Worth, 4,000.
G. Dean, senior vice president, 100.
W. M. Angle, retired, 15,488.
G. W. Codrington, director, Addressograph-Multigraph Corp., National Acme Corp., Allied Products Corp., 4,000.
B. E. Finucane, president, Security Trust Co. of Rochester, 1,000.[2]
J. H. Himes, president, Coastal Caribbean Oils, Inc., 3,000.
E. S. Land, director, Newport News Shipbuilding and Drydock Co., 422.
O. Marx, honorary chairman of the board of directors, 2[2].
T. R. McLagan, president, general manager, Canada Steamship Lines, Ltd., 1,264.
R. C. Patterson, Jr., chairman, finance committee, John C. Paige & Co., Inc., none.
R. Schley, chairman of the board, Howe Sound Co., 4,943.
T. A. Scott, honorary chairman of the board, Merritt-Chapman and Scott Corp, 366.

[1] Includes shares held in Marx and Finucane family corporations.
[2] A family corporation, in which Otto and Henry Marx are substantial stockholders, owned 2,100 shares.

(*Continued on page 60*)



Commander R. W. "Duke" Windsor poses with the record-breaking F8U-1 "Crusader" immediately after his 32-minute jaunt. Plane flew more than 400 miles—all but eighty of them at supersonic speed.

Purolator Micronic® filters help set 1015.428 mph speed mark

On August 21, this Navy Chance Vought F8U-1 "Crusader" set a new national speed record of 1015.428 miles an hour and won the famous Thompson Trophy. The plane, a standard production model, made two passes over the 15.1 kilometer course—both of them at speeds nearly 200 miles faster than the previous Thompson record.

This record flight put every component in the F8U-1 to its severest test. For, at 1000 mph, every component must function perfectly—whether it's the powerful J-57-P4 engine, the instrumentation, or the vital fuel, lubrication and hydraulic lines.

Effective filtration is essential on this F8U-1—as it has been on all aircraft for the past twenty-five years. Purolator Micronic filters ensure that fluids move freely, and give optimum performance, by filtering out sub-micronic particles of foreign materials which could cause serious trouble in a plane flying at record-breaking speed.

There are Purolator filters for aircraft oil, fuel, hydraulic fluid, air and gas systems—for both standard and special applications.

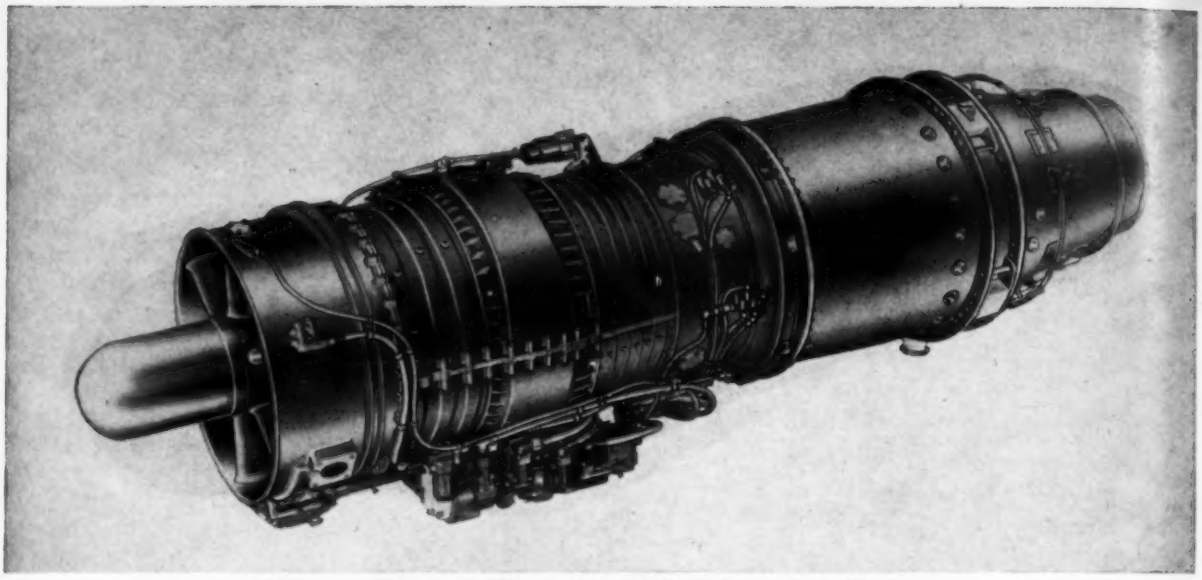
All of them are the products of continuing research and improvement, designed and made to meet the most stringent requirements. For more information on Purolator Aviation Filters, write today to Dept. A5-12.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada



Westinghouse Unveils J54, New Jet Engine

First flight tests have been completed in North American B-45 testbed with new Westinghouse J54 twin-spool jet rated at about 6,200 lbs. thrust. Company officials report recent completion of 150-hr. endurance tests, culminating 31-month program from initial design and development to first flight. To date Westinghouse has completed more than 500,000 manhours of J54 engineering, in excess of 25,000 hours of component testing and more than 1,100 hours of engine tests.

[2] A family corporation, in which M. Finucane is a substantial stockholder, owns 1,215 shares.

Grumman Aircraft Engineering Corp.
Shares of common stock outstanding: 2,200,000 (Mar. 16, 1956).
Shares controlled by directors: 307,150 (Mar. 8, 1956).
L. R. Grumman, chairman of the board, 160,380.
L. A. Swirbul, president, 10,500.
W. T. Schwendler, executive vice president, 51,900.
E. C. Towl, administrative vice president, 9,900.
A. P. Loening, president of Agawam Aircraft Products, Inc., 38,500.
E. W. Poor, treasurer, 35,090.
C. A. Wight, business executive, Freeport Sulphur Co., 880.

Lockheed Aircraft Corp.
Shares of capital stock outstanding: 2,830,504 (Feb. 29, 1956).
Shares controlled by directors: 102,145[1] (Mar. 1, 1956).
R. E. Gross, president, 71,000[2].
C. S. Gross, executive vice president, 12,127[2].
C. A. Barker, Jr., vice president and treasurer 1,000.
C. Chappellet, vice president, 10,073.
H. L. Hibbard, vice president, 2,424.
C. B. Squier, vice president, 2,425.
G. Brashears, secretary-treasurer, Gladden Products Corp., none.
W. A. M. Burden, partner, A. M. Burden & Co., capital investments, 1,000.
J. V. Carmichael, president, Scripto, Inc., none.
E. S. Dulin, president, Byron-Jackson Div., Borg-Warner Corp., 242.
H. L. Dunn, partner, O'Melveny and Myers, attorneys, 242.
W. W. Keith, president, Cosgrove and Co., Inc. of Los Angeles, insurance brokers, 400.
[1] Includes 1,212 shares held by R. E. Gross and C. S. Gross under will of R. H. Gross.
[2] R. E. Gross and C. S. Gross, under will of R. H. Gross, hold 1,212 shares as beneficiaries after termination of life interest.

The Glenn L. Martin Co.
Shares of capital stock outstanding: 2,700,971 (Jan. 31, 1956).
Shares controlled by directors: 39,715 (Feb. 1, 1956).
G. M. Bunker, president and chairman of the board, 5,300.
H. Bruce, (nominee), chairman of executive committee. Worthington Co., 4,504.
E. H. Pixley, vice president, Mellon National Bank and Trust Co., 115.
A. B. Royce, (nominee), Chadbourne, Park, Whiteside, Wolff and Brophy (partner) attorneys, 231.
F. F. Russell, chairman of the board, Cerrode Pasco Corp., mining, none.
D. M. Spencer, chairman of the board, The Fiduciary Trust Co. of New York, 1,050.
J. L. Sullivan, partner, Sullivan, Bernhard, Shea and Kenney; Sullivan and Wynot, attorneys, 8,715.
J. B. Wharton, Jr., director, 19,800.

McDonnell Aircraft Corp.
Shares of common stock outstanding: 720,000 (June 30, 1955).
Shares controlled by directors: 268,683 (June 17, 1955).
J. S. McDonnell, president, 114,979[1].
R. H. Charles, executive vice president, 2,446.
C. W. Drake, vice president, 4,500.
K. Perkins, vice president, 1,100.
W. A. McDonnell, president, First National Bank of St. Louis, 2,000.
T. S. McPheeters, partner, law firm of Bryan, Cave, McPheeters and McRoberts, 2,800.
W. R. Orthwein, Jr., vice president, 5,300.
S. W. Souers, chairman of the board, General American Life Insurance Co., St. Louis, 500.
J. E. Webb, president, Republic Supply Co., Oklahoma City, 200.
[1] In addition, members of the McDonnell family owned 94,717 shares. Mr. McDonnell is director of McDonnell Foundation which owns 40,141 shares.

North American Aviation, Inc.
Shares of common stock outstanding: 3,435,033 (Dec. 15, 1955).
Shares controlled by directors: 7,850 (Dec. 15, 1955).
J. L. Atwood, president, 900.
J. H. Kindelberger, chairman of the board, 1,750.
R. A. Lambeth, vice president and treasurer, 100.
R. H. Rice, vice president, 1,100.
J. S. Smithson, vice president, 50.
G. B. Brophy, vice president, 100.
H. B. DuPont, vice president, E. I. Du Pont de Nemours Co., 2,000.
H. G. Fales, vice president, International Nickel Co., Inc., 1,000.
R. A. Lovett, member of firm of Brown Brothers Harriman & Co., Banking, 500.
W. C. Mullendore, chairman of the board, Southern California, Edison Co., 100.
A. G. Roach, president, Columbia-Geneva Steel Div. of the U. S. Steel Corp., 100.
C. A. Rude, chairman of executive committee, Security-First National Bank of Los Angeles, 150.

Northrop Aircraft, Inc.
Shares of common stock outstanding: 1,499,900 (Oct 18, 1955).
Shares controlled by directors: 13,152 (Sept. 27, 1955).
W. C. Collins, president, 8,496.
W. C. McDuffie, chairman of the board, 242.
R. J. Pagen, vice president and treasurer, 1,452.
J. Allen, member of executive staff of Atlas Corp, 200.
E. W. Carter, president, Broadway-Hale Stores, Inc., department stores, none.
W. B. Collins, investment management, 1,000.
E. M. Jorgensen, president, Earle M. Jorgensen Co., 1,000.
R. W. Millar, managing partner, Wm. R. Staats and Co. investment banking, vice president of corporation, 100.

(Continued on page 62)

Complete Oxygen Protection *in 2 Seconds*

with the New SCOTT-AIRMED STRAT O...SET

COMBINATION HEADSET, MICROPHONE AND OXYGEN MASK

Above: Strat O... Set with Headset in use; Mask in standby position, instantly ready. (Boom mike shown, available if desired.)

Left: Strat O... Set with Headset and Mask in use. Comfortable, perfect seal.

Earphones are available in one or both ear pads.

No Groping... No Adjusting... Gives Mask Protection without Mask Discomfort!

ALREADY IN SERVICE ON ONE OF THE WORLD'S LARGEST AIRLINES

For flight crews of pressurized or unpressurized aircraft, flying at altitudes where oxygen may not normally be required . . . but where its instant availability is imperative. The Strat O... Set provides respiratory protection up to 45,000 feet with Demand or Pressure-Demand Oxygen Equipment.

NEVER BEFORE SUCH COMFORT, IN USE OR AT REST

The Strat O... Set is a completely integrated personal communication and respiratory unit. So finely balanced and light in weight (approx. 2 lbs.) it can be worn comfortably for long periods of time. After initial adjustment to wearer, the Strat O... Set's comfortable contour fit is duplicated each time the mask is snapped into place.

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SINCE 1932 Scott FOR SAFETY - FOR SERVICE

SCOTT AVIATION CORP.

212 ERIE STREET LANCASTER, N. Y.

Export: Southern Oxygen Co., 15 West 57th Street, New York 19, N. Y.

Circle No. 27 on Reader Service Card

(*Continued from page 60*)

J. O'Melveny, partner, O'Melveny and Myers, attorneys, 342.

A. E. Ponting, vice president of Blyth and Co., Inc., investment bankers, 220.

R. H. Rolapp, vice chairman, Pacific Mortgage Corp., 100.

Piper Aircraft Corp.

Shares of common stock outstanding: 843,064 (Dec. 31, 1955).

Shares of preferred stock outstanding: 46,424 (Dec. 31, 1955)

Shares of common stock controlled by directors: 295,576 (Dec. 1, 1955).

Shares of preferred stock controlled by directors: 17,069 (Dec. 1, 1955).

W. T. Piper, president, 136,256 common, 8,320 preferred[1].

N. J. Greene, salesman, Boenning & Co., stockbrokers, 10,000 common.

R. K. Griffin, owner, R. K. Griffin Co., 300 common, 175 preferred.

E. N. Hunting, president, Hunting, Larsen and Dunnells, Inc., engineers and architects, 1,000 common.

W. C. Jamouneau, secretary and chief engineer, 300 common.

H. Piper, vice president, 18,800 common[2], 2,437 preferred.

T. F. Piper, vice president, 18,000 common[2], 2,303 preferred.

W. T. Piper, Jr., executive vice president, 18,520 common[2], 1,182 preferred.

C. W. Pool, treasurer, 200 common.

[1] In addition, 146,200 shares common stock are in the name of members of family; this includes 18,000 shares in each of three sons' names. 2,652 shares preferred stock are in family members' names.

[2] 18,000 of each son's common stock is held in trust by P. T. Piper, and voted by him.

Republic Aviation Corp.

Shares of common stock outstanding: 1,472,013 (Feb. 1, 1956).

Shares controlled by directors: 225,135 (Feb. 1, 1956).

M. I. Peale, president, 4,939.

W. G. Bain, vice president and general manager, 103.

A. Kartveli, vice president and chief engineer, 2,928.

R. L. Clarkson, chairman of the board, American Express Co., 146.

F. G. Coburn, Associate of Jackson and Moreland, consulting engineers, 300.

E. S. Moore, executive vice president, National Biscuit Co., 665.

P. Moore, finance, 214,500.

W. H. Moore, executive vice president, Bankers Trust Co., 605.

L. Platt, attorney and member of firm of Bleakley, Platt, Gilchrist and Walker, 292.

H. N. Taylor, attorney and member of firm of Bleakley, Platt, Gilchrist and Walker, 146.

R. C. Taylor, vice president, American Can Co., 511.

Ryan Aeronautical Co.

Shares of capital stock outstanding: 426,493 (Oct. 31, 1955).

Shares controlled by directors: 57,000 (Jan. 20, 1956).

T. Claude Ryan, president, 50,900.

G. C. Woodard, executive vice president, 100.

E. D. Prudden, retired, 4,000.

C. A. Smith, vice president, U.S. National Bank, San Diego, 1,000.

M. H. Lockett, CPA, partner, Mattison, Thomas and Lockett, Los Angeles, 1,000.

Temco Aircraft Corp.

Shares of common stock outstanding: 1,676,835 (Dec. 31, 1955).

Shares controlled by directors: 279,865 (Dec. 31, 1955).

R. McCulloch, president, 44,159.

H. L. Howard, executive vice president, 24,839.

D. H. Byrd, president, Byrd Oil Corp., 133,973.

O. R. Moore, president, American Security Insurance Co., 76,584.

J. C. Cumby, senior vice president, Republic National Bank of Dallas, 310.

United Aircraft Corp.

Shares of common stock outstanding: 4,874,672 (Feb. 13, 1956).

Shares controlled by directors: 50,256 (Feb. 13, 1956).

F. B. Rentschler, chairman, 25,028 common.

H. M. Horner, president, 12,000 common.

L. S. Hobbs, vice president, 3,000 common.

W. R. Robbins, vice president and controller, 4,200 common, 210 preferred.

M. B. Brainard, chairman, Aetna Life Insurance Co., 180 common.

F. W. Cole, attorney-at-law, 540 common, 27 preferred.

O. Enders, president, Hartford National Bank and Trust Co., 360 common, 18 preferred.

P. M. Fraser, chairman, Connecticut Mutual Life Insurance Co., 540 common.

J. P. Ripley, chairman, Harriman Ripley and Co., Inc., investment bankers, 3,000 common.

H. C. Sheperd, chairman of the board, The First National City Bank of New York, 38 common.

H. G. Stoddard, chairman of the board, Wyman-Gordon Co., 1,370 common.

Scientist Urges More Basic Ozone Research

Scientists and engineers have merely "scratched the surface of basic ozone research," Dr. Haldon A. Leedy, director of the Armour Research Foundation, told the First International Conference on Ozone in Chicago. The conference was sponsored by the Armour foundation, the National Science Foundation and 12 industrial organizations.

Ozone is composed of tri-atomic oxygen. Its use as a super-oxidant for rocket propulsion fuels is eagerly sought by fuel technologists. Research on ozone was started by the Armour foundation 15 years ago and five years later it produced liquid ozone. But, said Dr. Leedy, 90% of the research is of the applied variety, and more basic knowledge is needed.

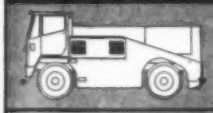
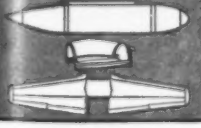
Potential users of ozone have been perplexed by the problem of combining high concentrations of ozone and organic fuel elements without incurring violent explosions.

Conferees compared notes on their experiences with accidental explosions of liquid ozone in their laboratories and means of preventing them. A breakthrough leading to the safe mixing of ozone with other combustibles was predicted.

USAF Gets Last of More Than 6,000 F-86s

North American Aviation has delivered the last F-86 Sabre to the Air Force. More than 6,000 were built in nine years' production. Capt. Ralph S. Parr, Korean jet ace, left, accepts the F-86F from Ralph H. Ruud, assistant general manager of NAA's Los Angeles Div.

CAPABILITIES . . . Manpower, Tools and Experience

BEECH BUILDS	
	MA-3 MULTI-PURPOSE VEHICLES
	C-26, MD-3 POWER UNITS
	8-PLACE BEECHCRAFT SUPER 18
	6-PLACE BEECHCRAFT TWIN-BONANZA
	4-PLACE BEECHCRAFT BONANZA
	BEECHCRAFT T-34 TRAINERS
	BEECHCRAFT L-23 TRANSPORTS
	TANK-WING-MAJOR SUBASSEMBLY SUBCONTRACT PRODUCTION

Producing canopies and windshields for CONVAIR'S USAF F-102 jet fighter is a proud undertaking for Beechcraft. We're busily engaged, too, in classified engineering design studies of other F-102A and F-106A aircraft components.

For more than 24 years Beech Aircraft Corporation has served the aviation industry, earning an enviable reputation for quality products and on-schedule deliveries. Beechcraft's five major plants with 1¾-million square feet of plant area and more than 6,000 skilled employees are at work on a wide variety of prime and subcontract orders . . . including special projects for BOEING, McDONNELL, REPUBLIC, LOCKHEED and other leading aircraft manufacturers who depend on Beechcraft's capabilities.

If your company has a research, design, development or production problem, an inquiry addressed to our Contract Administration Division will bring immediate information on how Beechcraft's manpower, tools and experience can help. Write today.

Beechcraft

BEECH AIRCRAFT CORPORATION, WICHITA, KANSAS, U. S. A.

New Products and Processes

PANELESCENT LIGHTING

A wafer-thin lamp that produces light by utilizing the principle of electroluminescence has been applied by **Sylvania Electric Products Inc.** to an aircraft control panel, passenger identification signs and a tachometer indicator.

The control panel and signs are being produced by Plastek, Inc. and Sun Dial Corp., while the tachometer indicator is being tested by the General Electric Co. in Lynn, Mass.

The Panelescent lamp is Sylvania's trade name for a light source created by the excitation of certain phosphors placed in an electric field. The .025" thick lamp consists of porcelainized steel with a ceramic-phosphor coating. It sheds a uniform light without bulbs, tubes, filaments or cathodes.

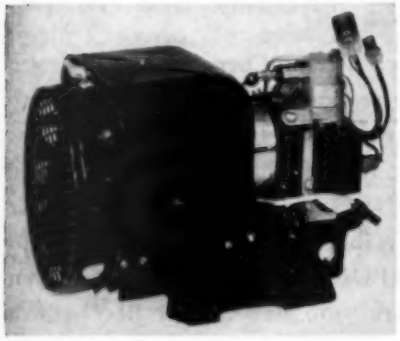
The aircraft control panel that uses a Panelescent lamp operates at 600 volts, 400 cycles, but can also be operated at lower voltages.

Advantages for aircraft applications are its thin-ness, ruggedness, economy of operation, low operating temperature, imperviousness to moisture and ability to withstand severe temperature changes.

Circle No. 109 on Reader Service Card.

PNEUMATIC SYSTEM

Walter Kidde & Co., Inc. is supplying the pneumatic system for the Fairchild F-27, said to be the first American-built plane in production that replaces traditional hydraulic primary actuating systems with pneumatic systems.



The F-27 is being equipped with two Kidde 2-D compressors, each of which develops 3,300 psi, 2 scfm at sea level. The compressors are powered from gear boxes driven by 1,600-shp Rolls Royce Dart engines.

Output of the compressors is stored in a 600-cu.-in. reservoir, a 100-cu.-in. emergency storage reservoir and a 100-cu.-in. air storage reservoir for the operation of wheel brakes and anti-skid device.

Pneumatic power for the operation of the main and nose landing gear, gear-up locks, nose-wheel steering, tail bumper and propeller brakes is all drawn from the main reservoir.

Circle No. 112 on Reader Service Card.

TITANIUM DESCALING

Turco Products, Inc. has developed a process that efficiently descales titanium and its alloys without adversely affecting physical and chemical properties of the metal.

There are only two immersion steps involved, one for scale-conditioning and one for scale-removing, and two rinsing steps. The Turco process eliminates the disadvantages of descaling titanium by sand-blasting, vapor-blasting or by immersion in molten salt baths.

The process requires relatively low temperatures (270-280°F), results in low metal loss (.0001" to .0003" per side) and is inhibited to avoid hydrogen pickup and the resultant hydrogen embrittlement (± 4 ppm or .0004% hydrogen per cycle). Literature is available.

Circle No. 111 on Reader Service Card.

THIN-WALL TUBING

Universal Tube Corp. has developed a new process for forming and welding very light-gauge tubes in continuous lengths from high-tensile, cold-rolled alloy strip.

Advantages are said to include the availability of continuous lengths to 200 ft., better mechanical properties for corresponding metal thicknesses and diameters and lower cost than seamless drawn tubes in equivalent sizes.

Very light-gauge welded tubing is available in stainless steel (all types), carbon steel, titanium, brass, bronze and other weldable alloys, in wall thicknesses graduated from .005" for ¼" O.D. to .015" for 1¼" O.D.

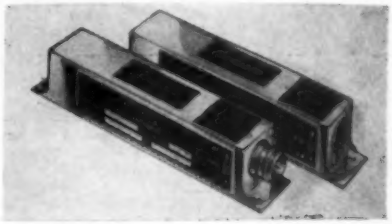
Stainless steel tubing made by this process (types 321 or 347 alloy) conforms to Spec. MIL-T-6737A for aircraft pneumatic ducts used under high-pressures, high-temperature (1,500°F) and corrosive conditions.

Circle No. 104 on Reader Service Card.

ACCELEROMETER

A small, lightweight potentiometer-type accelerometer introduced by **Genisco, Inc.** measures lateral accelerations in two mutually perpendicular planes.

Designated Model GDM, the instrument is said to be ideally suited for aircraft and missile instrumentation. It operates satisfactorily at temperatures between —10°F and 180°F and will withstand mechanical and thermal shocks encountered in supersonic flight.



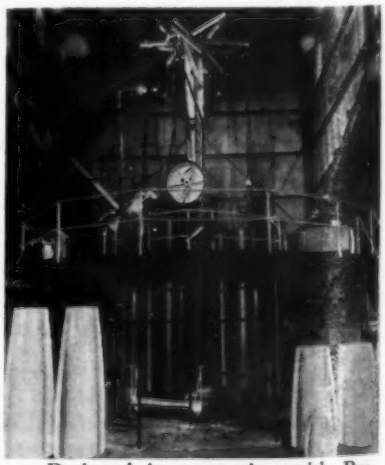
The unit incorporates two linear potentiometers internally mounted at right angles, which gives it wide operational application and eases installation problems.

Balanced-range units are available in ranges from 2 Gs and ±30 Gs inclusive. Unbalanced-range instruments are also supplied.

Circle No. 110 on Reader Service Card.

FORMING MACHINE

A forming machine that turns out plastic cylindrical shapes at low cost has been developed by the **Pastushin Aviation Corp.** It has been nicknamed "carousel" because of its rotation of as many as six tubular molds at high velocities to produce shapes by centrifugal action.



Designed in connection with Pastushin's GFR (glass fiber resin) process (AMERICAN AVIATION, Dec. 17, 1956, p.

56), the machine produces parts as large as 10 ft. long and 44" in diameter at the rate of one every ten minutes, with a single operator.

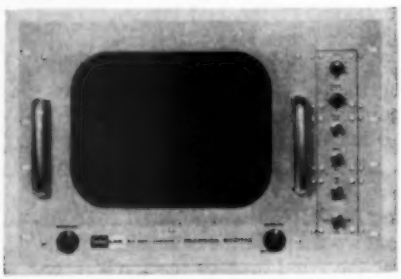
The manufacturer says exceptional strength, uniformity and tolerances are provided by the centrifugal action. Typical applications include the forming of missile and jet engine containers, aircraft fuel tanks and missile body components.

Experimental production is under way on components for the Air Force, Navy, Army and civilian contractors.

Circle No. 105 on Reader Service Card.

INDUSTRIAL TV MONITOR

A new 14-inch screen video monitor receiver for industrial use has been announced by **Kay Lab.** Video bandwidth is over 8 mc and horizontal resolution is over 600 lines.



Synch is provided by blanking pulses on the video waveform. Either cabinet or 19" rack mounting is available. The rack mount will accept up to three remote control panels for pan-tilt, iris-focus, 3-lens turret, or other camera control.

The ARM-14 will operate up to 1,000 feet from the camera without a line amplifier.

Circle No. 135 on Reader Service Card.

STAIN REMOVER

An aircraft exhaust track stain remover, designated Octagon 470, is available from **Octagon Process, Inc.** It is said to be highly successful in removing stains from Cat-A-Lac finishes and in removing oil, grease and general soil from painted and bare metal surfaces of aircraft.

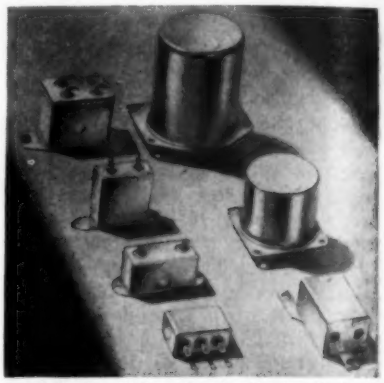
The cleaner is non-inflammable, non-toxic and non-irritating and has no offensive odor. It is available in standard 54-gal. and 5-gal. drums and in one-gal. case lots, 6 to a case.

Circle No. 116 on Reader Service Card.

FILTERS AND CAPACITORS

Airborne Accessories Corp. has added smaller, more efficient filters and capacitors to its line of aircraft equipment. One of the units is a 2½-oz. capacitor which, at triple the voltage, has twice the capacity of a conventional 10-oz. capacitor.

The units are vacuum-impregnated with polyamide resin and hermetically sealed in drawn cases. They are said to retain their properties from —65° to +300°F.



Circle No. 112 on Reader Service Card.

ALUMINUM-CLAD COPPER WIRE

Westinghouse Electric Corp. offers an enameled aluminum-clad copper wire that is said to combine the high electrical conductivity of copper, the superior oxidation-resistance of aluminum and the protection of insulating enamel.

The aluminum "skin" is only 2.5 mils thick (about .0025"). Developed by the Westinghouse Materials Engineering Dept., the wire promises to increase the life, reduce the size and raise the efficiency of electrical equipment by enabling it to operate over long periods

at higher temperatures than practical.

According to the manufacturer, no insulation completely seals a wire from air, which eventually seeps through to attack copper. At high temperatures, copper unites chemically with oxygen to form a layer of copper oxide on the surface of the wire. The layer gradually grows in depth, causing the insulation to degrade.

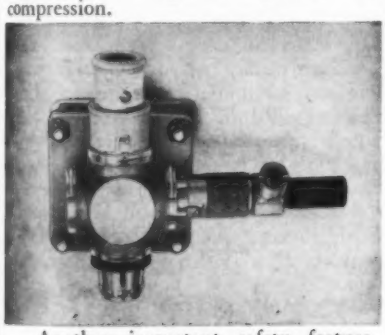
Oxide formed on the surface of aluminum does not grow appreciably. When only about .0000004" thick, it forms a self-protecting coating that prevents further penetration of oxygen.

Circle No. 103 on Reader Service Card.

OXYGEN MANIFOLD

A 4-way oxygen manifold developed by **Sierra Engineering Co.** provides several advanced features for pilot protection in high-speed, high-altitude bailouts.

Designated Model 195, the unit has as an optional safety feature a decompression valve in one of the four threaded ports. The valve operates to relieve all internal pressure on the manifold, hose and mask, thus affording protection against explosive decompression.



Another important safety feature is the bayonet-type connector between mask, hose and manifold which, according to the manufacturer, cannot be ripped loose by wind-blast. Literature is available.

Circle No. 113 on Reader Service Card.

ACTUATOR FOR ROTOR BLADES

The Garrett Corp.'s **AiResearch Manufacturing Div.** has developed an electrical actuator for trimming the pitch of helicopter rotor blades. It is said to accomplish in four seconds a job that ordinarily requires nearly an hour's work by a ground crew with a manually adjusted turnbuckle.

Nicknamed "the flying turnbuckle," the actuator will be installed on the turbine-powered Bell XH-40 to trim the pitch of the main rotor blades automatically.

Normally, vibration resulting from out-of-trim conditions is corrected by manually pushing a marking brush upward to the revolving blades. When contact is made with the blade moving in the lower plane, the marking brush is

dropped and the motor shut off. A crewman then adjusts the marked blade with a turnbuckle to synchronize it in a common plane of rotation with the other blade.

With the AiResearch actuator, a 1/10" movement of the actuator arm achieves synchronization, which can be sensed by the pilot as vibration fades.

The actuator weighs 1½ lbs. and is powered by a 1⅛" dc motor.

Circle No. 108 on Reader Service Card.

ELECTRONIC TIME DELAY

G. C. Wilson & Co. offers an electronic time delay that requires no warm-up and consumes as little as one watt of power.

Hermetically sealed, the unit was developed for military equipment and is used in guided missile and aircraft. Cold cathode tubes, said to be unaffected by vibration, are employed in a patented circuit to provide accurate delays down to 3 milliseconds and up to 30 seconds.

Designated Type EHS, the timer measures 2" x 2¼" x 3⅛" and weighs 9 oz.

Circle No. 106 on Reader Service Card.

MARKER BEACON ANTENNA

Telectro Industries Corp. has introduced Model AT-134 75 mc marker beacon antenna designed for flush mounting at the bottom of an aircraft fuselage.

The antenna cavity is a flanged, deep drawn aluminum case. A slotted shaft for the variable loading capacitor extends through the closed top of the case for access and screwdriver tuning.

A receptacle for antenna lead-in and an 18mm threaded hole are on the case side. The hole is for antenna dehydration.

The antenna is a shunt-fed, bent

channel element top-loaded with a variable capacitor in parallel with a 25-mmf temperature compensated fixed capacitor. The unit measures 11¾" x 7¾" x 3¼".

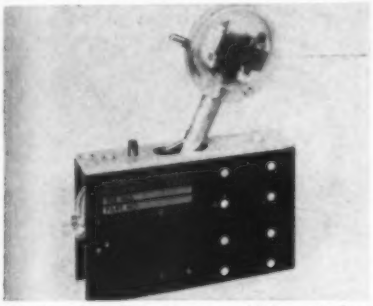
Circle No. 137 on Reader Service Card.

LANDING GEAR CONTROL

Wemac Inc. has developed a cockpit landing gear control that prevents inadvertent raising of the landing gear when in the "down" position.

Developed to specifications of the Lockheed Aircraft Corp. for its F-104 Starfighter, the control is capable of handling landing gears on other aircraft as well.

In operation, the pilot advances an illuminated wheel-shaped handle knob to lower the landing gear. The knob is pulled back to raise the gear.



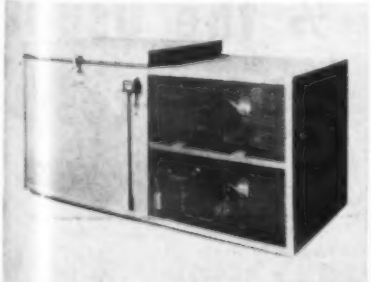
As the handle moves, AN switches actuated by a slide cam raise or lower the gear. The handle can be moved to the "gear up" position only after a continuous-duty solenoid is energized to unlock the handle.

The unit is rated at 28 volts dc for continuous duty. It is housed in a package measuring 1⅛" x 2⅝" x 4⅜" and weighs 1.07 lbs.

Circle No. 107 on Reader Service Card.

LOW-TEMPERATURE CABINET

New 8-cu.-ft. industrial freezer developed by **Webber Engineering Corp.** is designed for testing electronic components, stabilization of metals and fitting operations involving thermal contraction and expansion. The Webber Model WE-8-125 has a "pull-down" from ambient temperature to —100°F in 30 minutes and an overall range to —125°F from ambient.



New unit accommodates four 10" x 10" x 10" cadmium-plated

Circle No. 32 on Reader Service Card. →

baskets for parts handling. Inside dimensions are 24″ x 24″ x 24″ and outside dimension 72″ long, 36″ wide and 38″ high. Freezer operates on 440 volt, three-phase, 60 cycle or 230-volt, single or three-phase 60 cycle electrical source.

Circle No. 114 on Reader Service Card.

'LOX' TRANSFER HOSE

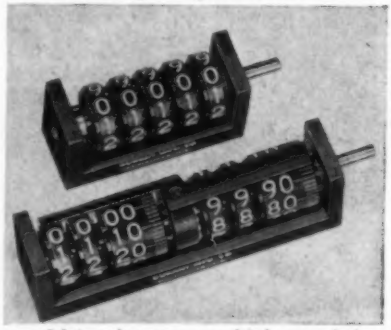
An insulated metal hose for transferring liquid oxygen, liquid nitrogen and other low-temperature liquids, even under extreme weather conditions, has been developed by **Cobra Metal Hose.**

Trade-named Cobra-Lox, the hose makes for faster and more efficient fueling of rockets and missiles. The inner hose is corrugated brass seamless tubing. Insulation is covered by what is described as an exclusive material that withstands abuse for long periods.

Circle No. 100 on Reader Service Card.

READ-OUT INDICATORS

A new group of instrument counters for electronic and instrumentation fields has been announced by **Durant Mfg. Co.** For use with radar controls, computers, missile tracking devices, etc., the "Y" series offers 96 standard variations for different design requirements.



Major features are high speed, less noise, less torque, longer life, rigidity and light weight. They are designed for up to 2,500 rpm intermittent duty, and weigh ¾ to 3½ ounces. Oilite bearings are used.

Circle No. 139 on Reader Service Card.

CAMERA MOUNT

A quick-disconnect-type mount for aircraft cameras and instruments offered by **Huber Industries, Inc.** provides locking against motion in any direction and is automatically self-centering.

Called the Duplex Vee-lock, the unit is said to be especially suitable for use in aircraft, guided missiles or ground-operated, automatic radar-controlled tracking equipment. In addition to cameras, it will hold securely telescopes, tracking and recording instruments.

Circle No. 101 on Reader Service Card.

RATE GYRO

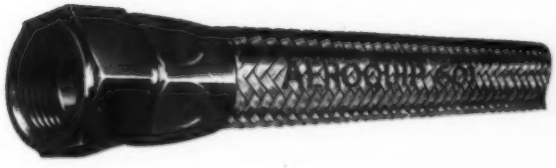
Humphrey Inc. has introduced a rate gyro, Series RG03-0100, designed for missile applications in which severe shock and vibration are encountered.

The unit has conventional spin axis orientation to permit easy interchangeability with other gyros. An exclusive wheel and gimbal system eliminates the use of pivots, bearings or loose springs. This design permits use

of a standard miniature motor and avoids loading the gimbal with static

Judge a Product by its Users

Proud achievement of advanced design and engineering is Lockheed's F-104A, world's fastest combat plane. Among the components contributing to "years ahead" performance are Aeroquip 601 Lightweight Engine Hose and ***"little gem"*** Fittings used for fuel, oil and pneumatic lines.



Aeroquip

REG. TRADEMARK

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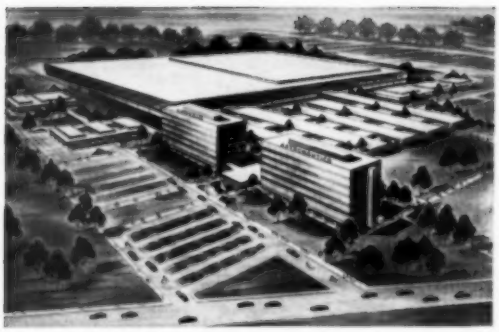
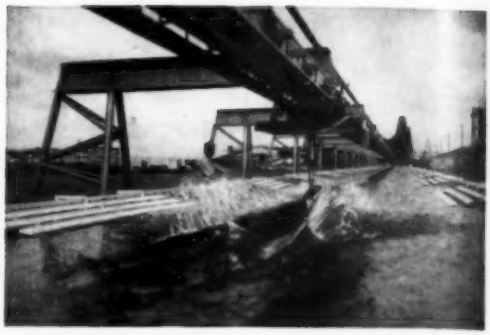
Local Representatives in Principal Cities in U.S.A., Canada and Abroad. Aeroquip Products are fully Protected by Patents in U.S.A. and Abroad. ***"little gem"*** is an Aeroquip Trademark

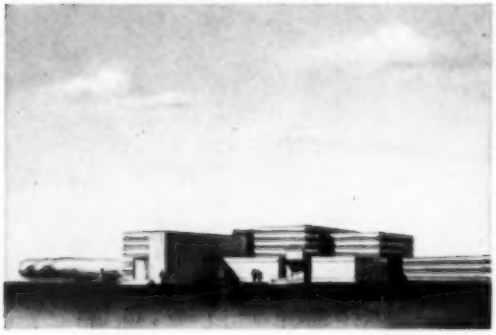
Here's the big "PLUS" for engineers...



New $40,000,000 plant for Convair-Astronautics facility, soon to be completed.



New $300,000 Convair San Diego seaplane towing tank, first unit of complete hydrodynamics laboratory.



New $3,500,000 supersonic wind tunnel now under construction at Convair San Diego.

La Jolla Cove, one of many beauty spots within easy reach of San Diego.

the advanced projects and facilities, PLUS beautiful, year-round San Diego living

Tremendous projects at Convair San Diego include the F-102A Supersonic Interceptor, the Metropolitan 440 Airliner, the Convair 880 Jet-Liner, and a far-reaching study of nuclear aircraft. To aid engineers in these projects, big new facilities are being added to the already vast Convair San Diego plant. These include a huge installation for research, development, production and testing of the Atlas intercontinental ballistic missile, an elaborate new seaplane towing tank, and a new supersonic wind tunnel.

You'll find an ideal engineering "climate" at Convair San Diego – excellent salaries, comprehensive personal advantages, engineering policies to stimulate your professional growth, and a rewarding association with men who are outstanding in their engineering fields.

Add to all these the big "plus" of delightful living in sunny San Diego, where America's kindest all-year climate gives you and your family full enjoyment of beaches, mountains, desert resorts, Old Mexico, Hollywood, and many other fun possibilities. For the big "plus" in your future, send full resume to H. T. Brooks, Engineering Personnel, Dept. 225

CONVAIR

C-V GD

A DIVISION OF GENERAL DYNAMICS CORPORATION

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mass of the motor.

Case height is 2.47″; diameter 2.13″ and weight 12 oz. Standard potentiometer pickoff is 5,000 ohms, with power dissipation up to one watt. Literature is available.

Circle No. 115 on Reader Service Card.

ILLUMINATED INDICATOR

A position distance indicator developed by **Marion Electrical Instrument Co.** is provided with uniform illumination of all pointer and dial markings. Brightness range (0.5 to 1.5 foot lamberts) meets military specifications for integral lighting.

The special lighting fixture that provides the even illumination permits in-flight replacement of the lamp without loss of the instrument's hermetic seal.

Designated Model FE 200, the instrument has a moving coil mechanism of the MEP-2D coaxial type, a design said to combine high performance stability and durability with extremely small size and light weight. Literature available.

Circle No. 99 on Reader Service Card.

RADOME

Chamberlain Aviation Corp. has developed a radome for the Aero Commander aircraft, designed for use with weather-avoidance radar such as the RCA AVQ-50.

The radome is supplied in kit form. No structural modification of the aircraft is required. Its nose section is of Fiberglas "sandwich" construction. The aft portion is a solid laminate of multiply Fiberglas cloth, faired out to conform with the fuselage contour. An air scoop is provided for cabin cooling and heated air.

CAIR radomes are also available for the Beechcraft 18, Lodestar, DC-3, B-23, B-24, C-54, Martin or Douglas B-26, PV-1; Learstar and B-25.

Circle No. 102 on Reader Service Card.

Super T-6 To Fly Next Month

Modified version of North American's T-6 trainer, developed by Erle L. Bacon Corp. of Santa Monica, was rolled out in preparation for first flight in February and completion of CAA flight tests by April. Super T-6 features a tri-cycle gear, modernized powerplant installation, one-piece canopy said to increase cruise speed by 30 mph—to more than 200 mph.

CAB Consolidates Probe of Irregulars

The complex Large Irregular Air Carrier Investigation, split into two separate phases by the Civil Aeronautics Board three years ago, has been re-established as a single-phase proceeding.

Leading to such a development was a joint motion granted by the U.S. Court of Appeals in Washington, D.C. last month, in which all parties agreed to a continued stay of that Court's reversal of a one-year-old Board decision in the first or policy phase of the case.

Original court reversal was in July but it had been stayed until December 28. CAB had advised it would not appeal the decision but asked until December 28 to decide how to proceed with the remanded case.

Under the new motion, CAB was relieved of making such an interim determination. The second phase of the case, dealing with individual applications of the large irregular carriers, is currently ripe for an examiner's report and should be ready for a Board decision in a few months. Thus, CAB can consolidate all its findings in one final decision.

N.Y. Airways Asks For More Mail Pay

New York Airways, certificated helicopter operator, asked CAB to increase its temporary mail pay. Company said its break-even need has been exceeding the $110,000 monthly pay it has been receiving. It asked that the new rate reflect September's $134,240 break-even level. Higher pay is needed because of start of service to the Manhattan Heliport and preparations for operations with new S-58s, it said.

Military Sets Up New Air Traffic Agency

All of the armed forces' commercial freight and passenger transportation in continental U.S. will be handled by one agency by Feb. 1, 1957.

Military Traffic Management Agency, established for that purpose under the Army's jurisdiction, expects to have all its functions phased in by that date. It is already handling commercial air transportation for 15 or more troops. Military air freight on commercial air carriers will be phased in next.

Tubeless Tires Reduce Weight of TWA Connies

Trans World Airlines operations officials estimate a weight saving of 50 pounds in the switch to tubeless tires on the four main landing gear wheels of its Lockheed Super G Constellations.

Converted into usable payload, TWA figures this saving provides an additional $11.34 worth of available airfreight lift on coast-to-coast flights. However, it was gained at virtually no cost to the airline as the tubeless tires are priced about the same as former tires and tubes.

Electras, 707s to Get M-H Fuel Gauges

New transistorized fuel-measuring systems developed by Minneapolis-Honeywell Regulator Co.'s Aeronautical Division have been ordered by Boeing and Lockheed for their 707 jets and Electra turboprops.

H-2 will produce various modifications of its system to suit airline customer specifications. However, all will consist of capacitance bridge circuit type tank probes, indicators and a totalizer.

This is the instrument that helps the jet pilot avoid burning up his engine. It's Honeywell Aero's transistorized Exhaust Gas Temperature Indication System—the null balance type, highly recommended by engine manufacturers. Hermetically sealed in a single package, it has a 1000°C. range with a ± 5° accuracy for an indefinite period without recalibration. Honeywell's EGTI has been specified for many of America's most advanced jet fighters and transports.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL

#1 Safety Factor for Jet Engines . . .

the ONLY Tester for EXACT HEAT & R.P.M. MEASUREMENT!

JETCAL®

analyzer

Tests EGT System Accuracy to ±4°C at Test Temperature

(functionally, without running the engine)

Tests RPM Accuracy to 10 RPM in 10,000 RPM (±0.1%)

This NEW "J" Model JETCAL contains NEW . . .
1) Tekcal, 21 "Te'Pot" Potentiometer.
2) Ruggedized Light-Beam Galvos,
4) Test Circuits.

Two of the most important factors that affect jet engine life, efficiency, and safe operation are *Exhaust Gas Temperature (EGT)* and *Engine Speed (RPM)*. Excess heat will reduce "bucket" life as much as 50% and low EGT materially reduces efficiency and thrust. Any of such conditions will make operation of the aircraft both costly and dangerous. The *JETCAL Analyzer* predetermines accuracy of the EGT and (interrelatedly) Tachometer systems and isolates errors if they exist.

The *JETCAL* is in worldwide use. Used by U. S. Navy and Air Force as well as by major aircraft and engine manufacturers. Write, wire or phone for complete information.

ANALYZES JET ENGINES 10 WAYS

1) The JETCAL Analyzer *functionally* tests EGT thermocouple circuit of a jet aircraft or pilotless aircraft missile for error *without running the engine or disconnecting any wiring.* GUARANTEED ACCURACY is ±4°C. at engine test temperature.
2) Checks individual thermocouples "on the bench" before placement in parallel harness.
3) Checks thermocouples within the harness for continuity.
4) Checks thermocouples *and* paralleling harness for accuracy.
5) Checks resistance of the EGT circuit *without the EGT Indicator.*
6) Checks insulation of the EGT circuit for shorts to ground and for shorts between leads.
7) Checks EGT indicators (in or out of the aircraft).
8) Checks EGT system with engine removed from aircraft (in production line or overhaul shop).
9) Checks aircraft TACHOMETER system accuracy from 0 to 110% RPM with guaranteed accuracy to within ±0.1% in the operating range.
10) JETCAL Analyzer enables engine adjustment to proper relationship between engine temperature and engine RPM for maximum thrust and efficiency during engine run. (Tabbing or Micing).

ALSO *functionally* checks aircraft Over-Heat Detectors and Wing Anti-Ice Systems (thermal switch and continuous wire) by using TEMPCAL Probes. Rapid heat rise . . . 3 minutes to 800°F! Fast cycling time of thermal switches . . . 4 to 5 complete cycles per minute for bench checking in production.

B & H INSTRUMENT also makes *TAKCAL* *TEMPCAL*

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JETCAL

Photo Machine to Aid AF Reconnaissance

An unusual photographic processing machine that controls individual development of as many as 3,000 negatives in an eight-hour day and will prevent the loss of important reconnaissance data has been acquired by the U.S. Air Force.

The machine, developed under the direction of the Air Research and Development Command, was built by the Houston-Fearless Div. of the Color Corp. of America. Eastman Kodak Co. contributed a radically new type of film.

Because AF reconnaissance planes must often fly under adverse weather and changing light conditions, the quality of aerial film negatives varies considerably. Ordinarily a roll of negatives is processed on an average development time, as a compromise. This inevitably results in some poor quality negatives and the frequent loss of important reconnaissance data.

The new processor, more than 24 ft. long and 6 ft. high, can operate in daylight, unlike most photographic processing machines. It can be disassembled and transported by air.

Heart of the unit is a complex evaluator which includes a series of oscillating mirrors, optical filters, photo multipliers, infrared scanning beams, light pipes and computers. Up to six negatives per minute can be developed accurately by the processor.

Airlines Would Help In Emergency—Tipton

If airlines were called on to handle the routine supply job now performed largely by Military Air Transport Service, more equipment and trained technical personnel would be available to the military "for some unhoped-for D-Day," Stuart G. Tipton, president of the Air Transport Association, told the Wings Club in New York.

Tipton called for a new military-airline partnership—"a partnership in which increased airline carriage of military traffic will free Defense Department resources for other tasks and will expand the national airlift without cost to the taxpayer . . .

"I can offer here and now on behalf of the scheduled airlines . . . to sit down and work out with responsible Pentagon authorities a plan which will provide for a greater contribution by the civil airlines without for one moment disturbing the ability of MATS to carry out its mission . . ."

BUAER'S NEW AVIONICS DIVISION MEETS ELECTRONIC WEAPONS NEEDS OF NAVY AIR ARM

U. S. Navy Photo

Brand new in the Navy Bureau of Aeronautics, the Avionics Division is responsible for all aspects of research and development of electronic fire control and weapons launching equipment for Navy aircraft and guided missiles. This Division deals daily with problems undreamed of as recently as World War II. To ensure that our Navy air arm will continue to be the most effective and ultra-modern in the world, it plans in terms of 10, 15, or 25 years hence. Its personnel must think in terms of Mach 10 speeds or altitudes of 20 or more miles.

This vital R & D mission, which was formerly accomplished by the joint efforts of Armament and Electronics Divisions, has been merged in the Avionics Division to include a wide variety of electronic functions. Among these are ground station telemetering and instrumentation; guidance systems; warheads; fusing and launching of guided missiles; fighter attack systems; airborne early warning systems, and many others.

To coordinate the many programs under its jurisdiction, the Division has established a "Project Manager" system of organization. This system provides maximum streamlined operation and facilitates industry contacts as well. The personnel of the Avionics Division thus are enabled to develop with maximum facility the incredible electronic equipment needed by today's and tomorrow's aircraft and missiles. With their special knowledge and far seeing outlook, they will make certain that the new higher speeds, altitudes and ranges of aircraft are utilized to full effectiveness.

◀**FJ-3 Fury goes aloft** from one of the after catapults of the U.S.S. Forrestal. An F2H-3 Banshee is in the foreground. Electronics developed by BuAer's Avionics Division provides planes such as these with their highly effective weapons and control systems.

▲**Engineer at Ford Instrument Company** opening salt spray chamber in which equipment for BuAer is being subjected to environmental test.

This is one of a series of ads on the technical activities of the Department of Defense.

FORD INSTRUMENT COMPANY
DIVISION OF SPERRY RAND CORPORATION
31-10 Thomson Avenue, Long Island City 1, New York
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ENGINEERS
of unusual abilities can find a future at FORD INSTRUMENT COMPANY. Write for information.

People

MANUFACTURING

Harrison W. Holzapfel named asst. mgr. of Garrett's AiResearch Aviation Service division, at L. A. International Airport.

Henry Blankenheim joined Piasecki Aircraft Corp. as production and factory mgr. of the International Airport plant and the Delaware Division at New Castle.

HOLZAPFEL

BLANKENHEIM

F. W. Lloyd and **G. C. Chalmers** appointed mgr. and asst. mgr., respectively, of mfg. engrg. for Northrop Aircraft, Inc.

Glenn D. Maxwell appointed asst. director of advanced electronic data laboratory, Consolidated Electrodynamics Corp.

Bernard Duperier appointed consultant to Boeing Airplane Co.'s transport division.

W. H. Toy named gen. supt. of Tapered Air Products Corp.

Monroe A. Maller appointed mktg. mgr. for Avien, Inc.

Donald C. McDonald appointed director of engrg. by the Friez Instrument Div. of Bendix Aviation Corp.

Leo J. Brancato appointed a vp of Heli-Coil Corp.

G. R. Moore named staff vp-sales and adv. for Thompson Products, Inc.

George R. Hickman is new technical employment mgr. for Republic Aviation Corp.; Kenneth D. Baldwin is asst. mgr.

Clarence Felix, a vp of Crosley Div., Avco Mfg. Corp., assumes charge of research, development product engrg., contract adm. and sales; **John Mihalic** appointed vp and dir. of mfg.

Francis W. Dunn promoted to asst. to pres. for public relations and public affairs for Bell Aircraft Corp. Appointments in new Research Division include: **John F. Hawkins**, adm. mgr.; **Robert E. Hannel**, services mgr.; **William Shultz**, sales mgr.; **Ronald E. Shainin**, contract adm. mgr.

George T. Hayes appointed asst. director of Stanford Research Institute's physical sciences division.

Leon F. Edelson named chief engineer for Nader Mfg. Co.

Jack E. Fairchild has joined the aviation safety staff of Univ. of Southern California as a lecturer in aeronautical engrg.

Richard M. Osgood appointed mgr. of the Waltham Laboratories of Sylvania Electric Products Inc.

Carl F. Herbold elected vp-manufacturing and **Ralph J. Eschborn** elected vp-engrg. of Jack & Heintz, Inc.

Semiconductor-components division of Texas Instruments, Inc. announces promotions of **L. E. King** to administrative sales mgr.; **Harry E. Goff**, products sales mgr., and **Mark S. Campbell**, semiconductor sales mgr.

Ralph E. Bond appointed deputy gen. mgr. for adm. of American Machine & Foundry Co.'s electronics div.

Byron C. Booth elected president of The George W. Borg Corp. **G. Marshall Borg** elected vice chmn. of the board.

Paul Stearns Ellison appointed director of public relations for Cook Electric Co.

H. C. (Spike) Deckard, exec. staff asst. to vp and mgr. of Convair's Fort Worth plant, retired.

T. M. Evans elected chairman and **Charles L. Holbert** elected president of H. K. Porter Co., Inc.

Dr. Sheldon H. Dike elected president and **Dr. Walter D. Wood**, vp of Dikewood Corp., new subsidiary of Radiation, Inc.

Robert A. Horn joins North American Aviation's Los Angeles Division as a utility pilot.

Ken Brigham appointed supervisor of public information for Sperry Gyroscope's marine, air and surface systems.

Avco Lycoming, a div. of the Avco Mfg. Corp., appoints presidential assistants: **Turner A. Duncan**, industrial engine operations; **Edward L. Woodyard** (USN, ret.), admin.; **Paul A. Deegan**, public rel. and adv.

Raymond H. Heller named head of sales dept., Robertshaw-Fulton Controls Co.'s aeronautical div.

William A. Aberg appointed Washington representative of All American Engrg. Co.

Lee S. Johnson named gen. mgr. Sikorsky Div., United Aircraft Corp., succeeding **Bernard L. Whelan**, who continues as vp of UAC.

James D. McLean becomes president and gen. mgr. Hoffman Laboratories, Inc., succeeding **John B. Moss**, who becomes chrmn. of exec. committee.

Carl J. Tsaloff named Akron plant mgr. for B. F. Goodrich Aviation Products.

Jack S. Parker, gen. mgr. of Aircraft Gas Turbine Div., elected a vp of General Electric Co.

TSALOFF

PARKER

AIRLINES

Henry G. Riegner promoted to asst. gen. adv. mgr. for Trans World Airlines; **John M. Keavey** appointed director of domestic advertising; **B. W. VanDel** named director of international advertising; **C. A. Finkbeiner** named director of promotional advertising.

Charles H. McKenney promoted to gen. traffic mgr. for Northeast Airlines, Inc.; **Edwin W. Breed** named gen. sales mgr.

Fred Benninger elected executive vp and treas. of The Flying Tiger Line.

Robert G. Baker appointed architectural engineer of Continental Air Lines; **Marvin I. Heldt** named west coast interline and agency sales mgr.

Donald W. Markham, formerly asst. gen. counsel of the Air Transport Assn. of America, and **Berl I. Bernhard** join Turney & Turney, Washington, D.C.

Howard C. Rolie appointed vp of Airborne Freight Corp.

Mrs. Elizabeth A. Holroyde named asst. to director of agency and interline

New CAA Administrator Takes Oath

James T. Pyle (right), acting administrator of CAA since the death of Charles J. Lowen, was formally sworn in as Administrator by Commerce Secretary Sinclair Weeks. Pyle is an Eisenhower recess appointee subject to Senate confirmation.

sales for Hawaiian Airlines.

Ralph E. Young appointed station auditor for Ozark Air Lines.

STEEGE

David L. Steege appointed vp and gen. mgr. of Newark Air Service, Newark Airport.

George E. Masters resigned as director of public relations for Northwest Airlines.

James F. Byrne named acting airport mgr. for Boston's Logan International Airport, succeeding **Albert L. Edson**, retired.

Capt. M. J. R. Alderson named technical mgr. (flight operations) for British Overseas Airways Corp. in addition to managing DC-7C fleet; **H. R. M. Roundell** named staff mgr. (flight operations).

Air France named **Jacques Scherer** exec. vp-equipment and the following asst. exec. vps: **Raymon Veillard**, finance; **Pierre Marion** and **Paul Besson**, operations. **Gaston Lafennechere** named adviser to the exec. vp-operations with rank of asst. vp.

Victor V. Carmichael, Jr., reinstated as president of Aerovias Sud Americana, certificated all-cargo line, replacing **Paull E. Dixon, Jr.**

Peter Tornqvist appointed west coast regional mgr. of Scandinavian Airlines System.

J. Lane named special asst. to gen. sales director for Trans-Canada Air Lines.

Dr. Leslie L. Thomason named director of air age education for Cessna Aircraft Co.; **Guy Miller** named mgr. of the company's Model 620 sales department.

H. C. Ross, Capital Airlines. Captain, Washington, D. C.

HONOR ROLL

(For 25 years' or more service in the industry)

Walter O. Locke, Ryan Areonautical Co. Asst. to the vp-manufacturing, San Diego, Calif.

A. J. Thursam, Convair. Dept. 603-2, San Diego, Calif.

P. Verhoye, American Airlines. Foreman, gen. trades, maintenance facilities, LaGuardia Airport.

H. D. Ford, American Airlines. Dist. sales mgr., Washington, D.C.

HONORS

Aubrey Keif, mgr. of the Aviation Sales Div. of The Texas Co., elected chairman of Aviation Technical Service Committee, Div. of Marketing of the American Petroleum Institute.

Galen Bertram elected president of National Aviation Trades Assn.

J. Geoffrey Notman, president of Canadair Ltd., elected president of Air Industries and Transport Assn., Canadian trade group representing airlines and aircraft manufacturers.

New officers of the National Aviation Club are: **Bernard J. Vierling** of Aircraft Supply Co., president; **Russell B. Adams** of Pan American World Airways and **Richard E. Fell** of Butler Aviation, vice presidents; **Samuel J. Solomon** of California Eastern Aviation, sec'y-treas.

Mundy Peale to Head IAS During 1957

Institute of the Aeronautical Sciences has elected Mundy I. Peale, president of Republic Aviation Corp., as its president for 1957. He succeeds Edward R. Sharp, director of the National Advisory Committee for Aeronautics' Lewis laboratory.

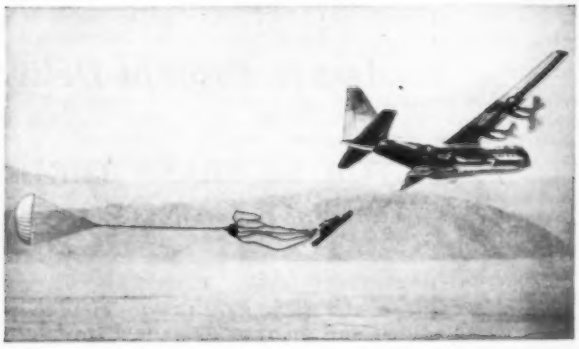
PEALE

IAS also named four new vice presidents: Roy E. Marquardt, president of Marquardt Aircraft Co.; Lt. Gen. Laurence C. Craigie (ret.), v.p.-engineering, Hydro-Aire, Inc.; E. E. Aldrin, consultant to Standard-Thomson Corp., and Earl D. Osborn, board chairman of Edo Corp.

Preston R. Bassett, consultant to Sperry Rand Corp., was named treasurer.

Edward Keightley, aviation sales mgr. of Union Oil Co. of Calif., Los Angeles, elected chairman of Aviation Advisory Committee of the American Petroleum Industries Committee.

Douglass F. Johnson, president of Aircraft Engineering and Maintenance Co., elected chairman of the board of Aircraft Service Assn.



NEW "FLYING WORKHORSE" JOINS USAF

First Delivery of Lockheed C-130 Hercules with Allison Turbo-Prop Power

It can take aboard a 5,000-gallon fuel tank and tractor.

It can carry 60 to 90 fully equipped combat troops – and land on small, hastily prepared fields close to combat areas.

It can airlift up to 20 tons of cargo swiftly and efficiently – and make parachute drops for on-the-spot aerial delivery.

It's the great new "workhorse" of the Air Force–Lockheed's versatile C-130 Hercules–now being delivered to the Tactical Air Command's 18th Air Force at Ardmore Air Force Base, Oklahoma.

Powered by four 3,750-horsepower Allison T56 Turbo-Prop engines driving three-bladed Aeroproducts Turbo-Propellers, the C-130 attains speeds of over 350 miles per hour–more than 100 miles per hour faster than other tactical transports. *And it does this at less than half the ton-mile cost of its nearest competitor.*

A commercial version of the T56–Allison's Model 501 Turbo-Prop engine powering the new Lockheed Electra–will bring jet-age speed and luxury to commercial service, with new smoothness and quiet on flights now serving 98% of the nation's commercial passenger traffic. 128 of these new luxury airliners have been ordered by six major airlines.

This great new concept in aircraft power reflects Allison's unmatched experience in the design and development of aircraft turbine engines and turbo-propellers.

ALLISON DIVISION OF GENERAL MOTORS–Indianapolis, Indiana

ALLISON
TURBO-PROP POWER

VERSATILE POWER FOR JET-AGE FLIGHT

International Aviation

By Anthony Vandyk

Which is the world's most seasonal air route? A likely contender for this unwelcome title is British European Airways' service from London to Jersey, one of the Channel Islands off the French coast. A whacking 1,250% more passengers fly on this route in August than in February.

Almost all of BEA's routes have seasonal peak-and-valley problems as shown by the following August/February traffic ratio examples: London-Palma, 4.8:1, London-Nice, 4.7:1; London-Paris, 2.5:1; London-Belfast, 2.2:1; and London-Glasgow, 1.7:1.

• **Because of** the high summer peak BEA has to work its aircraft fleet to the maximum in the summer months while in the winter there is the inevitable surplus of capacity. The question of utilization represents one of BEA's biggest headaches. Even during the summer a short-haul carrier like BEA is at a disadvantage as compared with the long-haul airlines.

Because the sectors are shorter, the number of takeoffs and landings in the same number of hours of flying is much greater. Consequently an aircraft in a short-haul airline must spend a higher proportion of its working day on the ground than an aircraft in a long-haul carrier of equal efficiency. Moreover, weather tends to affect the short-haul airline far more than its long-haul counterpart.

• **Despite the various problems** of utilization which plague BEA, the airline has been steadily getting more hours out of its aircraft. Since the Elizabethan (Ambassador) went into service in 1952/53, its utilization has increased from 1,103 hrs. per aircraft per year to 2,281 hrs. for the 12 months ended October 31, 1956.

The BEA Viscount 700 fleet which started off in 1953/54 averaging 1,457 hrs. per aircraft improved to 2,347 hrs. by October 31, 1956. BEA hopes that this figure will be upped to 2,500 hrs. very shortly.

Meanwhile, BEA is preparing to introduce the stretched-fuselage Viscount 800 early this year. It will gradually replace Elizabethans and DC-3s on short-haul routes.

The first of the new Viscounts, seating up to 65 passengers, will be put on the London-Paris route which has been operated with Viscount 700s by Air France for several years. This probably will be the first occasion that Viscounts have been operated by more than one carrier on any route.

Short SC-1 VTOL Aircraft Designed To Test Electronic Autostabilizer

Primary purpose of Short Bros. & Harland's SC-1 VTOL test vehicle is to flight-test the Short-designed electronic autostabilizer, essential to maintain the balance of any jet-lift aircraft. The system is similar to that used with the Rolls-Royce "Flying Bedstead": outrigger jets which supply restoring, or upsetting, couples that steady, or tilt, the aircraft in relation to the lift of the main jets and any control movement.

The basis for such a system is a rate-sensing gyro unit which "tells" the electro-mechanical control mechanisms the amount of corrective action to apply as well as its direction. Secondary purpose is to check that transition from levitation to propulsion (and the much more difficult reversal process) is practical.

Although the configuration proposed by Rolls-Royce's Dr. Griffith for his supersonic jet-lifter is a delta, the present airplane is purely for low-speed flight tests. Close connection between this Short VTOL airplane and the "Flying Bedstead" is emphasized by the fact that Short test pilot Tom Brooke-Smith practiced by flying the latter.

Brooke-Smith's comment was that it is "like learning to ride a bicycle"—suggestive not only of going back to first principles but also of the fact that *balance* is the essence of jet-lift flight.

• **On December 17** the SC-1 made its first ground rolls on propulsion jets. It will probably make its first flight as a conventional airplane. Once proven as an airplane, first vertical trials will be made tethered by cables in a gantry (similar to the SNECMA "Flying Atar" rig) and will be designed to check thrust efficiency, balance by autostabilizer and response to controls.

Principal problem of transition will be the phasing out/in of the jet controls and concurrent phasing in/out of the aerodynamic surfaces involving stalling and un-stalling of the latter.

The SC-1 has a stubby fuselage and a thick-section delta-wing airfoil. Officially, it has five Rolls-Royce RB-108 turbojets—once referred to as "distant cousins" of the 1,800-lb. thrust Soar. A fair supposition would be four for levitation and one for propulsion; based on vertical thrust equal to weight *plus* 25% and propulsion thrust/weight ratio of 0.25.

• **The pump fuselage** features a very bulky mid portion where the vertical jets are mounted close to the c.g. There is clear evidence of large doors in top and bottom for air intake and efflux, respectively. Small nose blister, bulged fairing under wingtips and another bulge at the tail reveal location of balance/control jets. On the "Flying Bedstead" these were pressure jets supplied by compressor bleed.

Dorsal intake (of low-efficiency form because forward speed is immaterial and takeoff thrust will not normally be required) will feed the tail-mounted propulsive RB-108. The fixed gear features obviously long-stroke legs to absorb vertical descents.

Twin wheels and apparent absence of torque-link scissors suggest that each is castering. This would be in line with the requirements for an airplane landing vertically and capable of low-speed lateral motion in any direction.

Features of the Short SC-1 include: (1) tail balance/control jet; (2) aileron (or elevon) control crank; (3) fairing for lateral balance/control jet; (4) rudder; (5) propulsion jet intake; (6) vertical jet air-intake doors; (7) di-electric panel for special radio; (8) helicopter-style cockpit; (9) venturi; (10) front balance/control jet; (11) fixed long-stroke tripod gear; (12) dump valve drain.

West Coast Talk . . . By Fred S. Hunter

- **No IAS turbine pow-wow likely this year.**
- **Why Electra will be called 'propjet'.**

THE INSTITUTE of the Aeronautical Sciences probably will skip a turbine-powered air transportation meeting this year. It's on the look-out for a likely topic for a special event to be held in a west coast city, possibly San Francisco. The turbine-power event could be resumed in 1958 or 1959 when the new jets are nearer operation. This has been a good program, but the initial meetings held in Seattle and San Diego were pretty conclusive in covering the present state of the art and a recess for a year or two seems like a good idea if a good substitute program can be devised.

• • •

Lockheed's production of early warning WV-2s runs through the year 1958. Calendar-wise, this makes it the leader in the company's military production at Burbank. As we recall, Lockheed's present F-104 orders go into the winter of 1958 and the schedule on the T2V is about the same. T-33 production continues into the summer of 1958. All of these (even the T-33) may be extended further by additional orders, but the WV-2 is the one with the long-range production potential. If Lockheed succeeds in selling its proposed follow-on model incorporating the big 43-foot saucer radome and other advances—which seems likely—the WV-2 will become a five-year or more program projecting into the 60's.

• • •

Speaking of names—both Allison and Lockheed have settled on "propjet" as being more properly descriptive than the long-established "turboprop" for turbine-propeller aircraft, such as the 501-powered Electra. There's advertising magic in that word "jet", boys. . . . There's also advertising magic in the word "Pacific" and now you know why Jack Connelly, Ted Mitchell, Ray Costello and Max King are all so eager to change Southwest Airways to Pacific Air Lines. . . . Small Defense Industries Association changed to Strategic Industries Association as a better characterization of the independent, privately-financed companies filling a major strategic need for the nation. . . . And, after months of travail, Lockheed and TWA have finally agreed on a name for the Model 1649A and soon will be proclaiming it in large black type.

• • •

Hunter

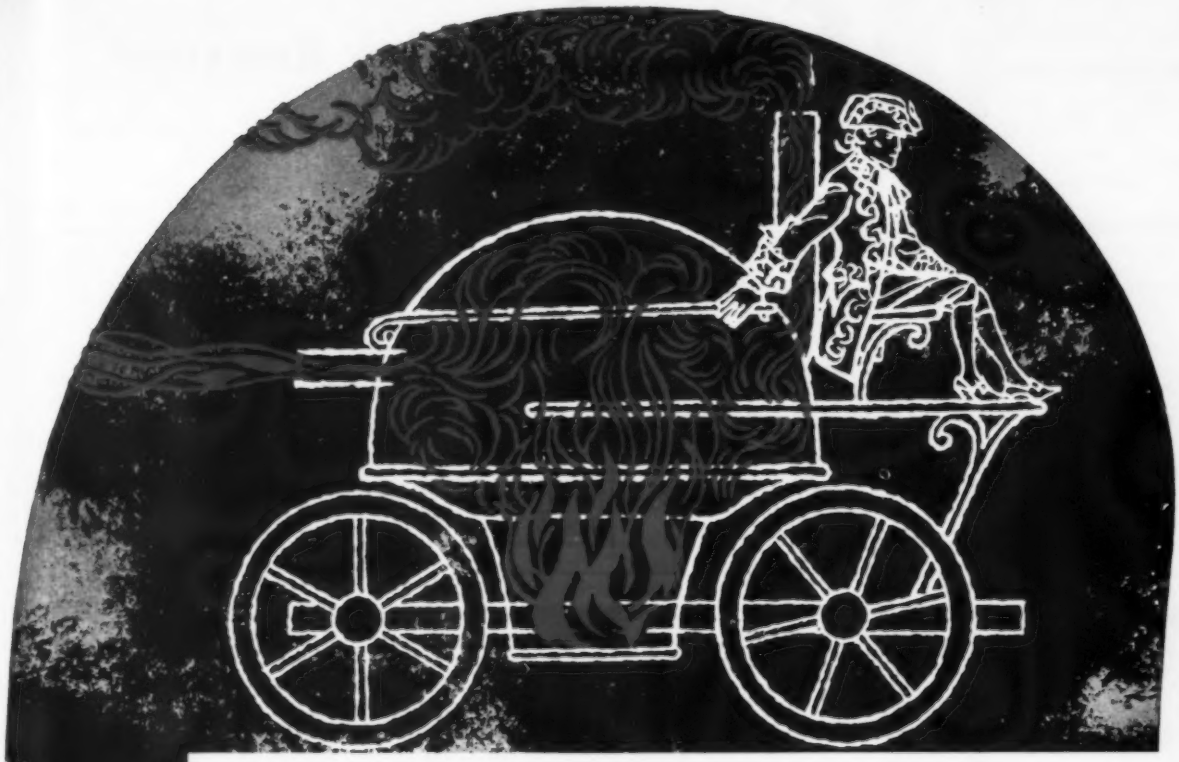
Marvin Landes, vice president-service of Western Air Lines, is looking toward the day when WAL handles more passengers than any other carrier at Los Angeles International Airport. This will come before too long, he declares. At present, WAL is in third place, United occupying the No. 1 spot and American being second. There's good reasoning behind the Landes prediction. The WAL curve in Los Angeles keeps going up consistently. Moreover, Los Angeles is the hub of WAL's system. Whenever there's a traffic increase, a route extension, an addition in service, the benefits filter directly into Los Angeles.

• • •

A recruiter for a west coast aircraft accessory manufacturer, returning from a swing around colleges in the east and midwest, reports that the range of starting salaries for 1957 engineering graduates will be $475/$500 per month. This compares with $400/$425 for 1956. The figures do not reflect only the aircraft industry. They apply to industry generally. One west coast aircraft manufacturer, eyeing the competition for the new engineers coming out of school outside as well as within the industry, is said to have set its starting scale at $525.

• • •

American Bosch Arma's selection of Larry Cooper to head up its newly established Los Angeles office makes it look as though it might contemplate some future manufacture on the coast. Cooper is a manufacturing expert. . . . Hydro-Aire has a jet actuator design in the mill, due soon. . . . Machinery Overhaul Co.'s normal complement of 185 employes is slated to increase to around 250 by mid-1957 to keep pace with the growing work load at this machine tool storage depot at Palmdale Airport, which officially is designated as "Air Force Departmental Industrial Equipment Reserve Storage Site No. 2."



s'Gravesande's Stoomwagen

s'Gravesande's Steam Reaction Car

In 1721 Jacob Willem s'Gravesande of Delft, stimulated by the recently enunciated Third Law of Motion, astounded the Royal Society by constructing a practical steam reaction car. The vehicle actually moved several times its own length, a distance of about two meters.

In 1956 the goal is no longer meters, but hundreds, and even thousands, of miles. Aerojet-General Corporation, leader in American rocket propulsion for more than a decade, is proud to participate in man's first assault on the frontiers of outer space—Project Vanguard.

Aerojet-General CORPORATION

A Subsidiary of The General Tire & Rubber Company

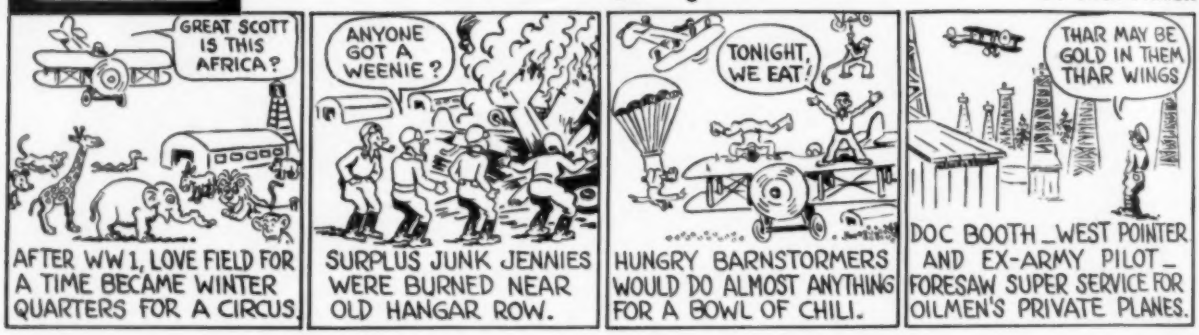
AZUSA, CALIFORNIA
SACRAMENTO, CALIFORNIA

Aerojet-General invites scientists and engineers—men of imagination and vision—to join the attack on the most significant research, development and production problems of our time.

SAC Silver Jubilee Newsreel

THE 20's THE LEAN YEARS

BY JACK PATTON



AFTER WW 1, LOVE FIELD FOR A TIME BECAME WINTER QUARTERS FOR A CIRCUS.

SURPLUS JUNK JENNIES WERE BURNED NEAR OLD HANGAR ROW.

HUNGRY BARNSTORMERS WOULD DO ALMOST ANYTHING FOR A BOWL OF CHILI.

DOC BOOTH—WEST POINTER AND EX-ARMY PILOT—FORESAW SUPER SERVICE FOR OILMEN'S PRIVATE PLANES.

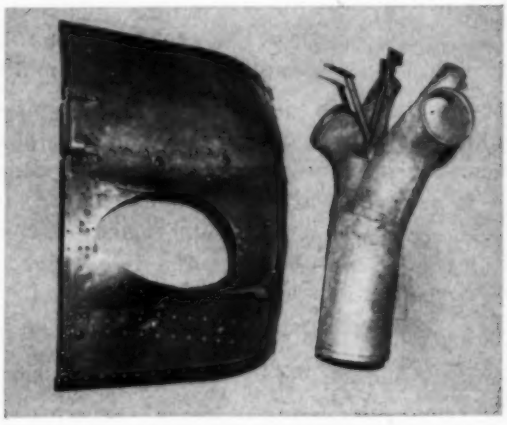
1932
A DREAM TAKES SHAPE

So—aided and abetted by Oil man-Rancher Charles Pettit—Doc Booth (top right photo) in 1932 opened the doors of old Hangar 1 to mark the start of the company now known as Southwest Airmotive. (Fast, sleek Lockheed Orion in foreground.)

Booth offered Travelair ambulance plane service.

1957
STILL PIONEERING

A BETTER DC-3 SHORT STACK INSTALLATION—Saves 44 lbs. wt., improves performance, cheaper to maintain, longlived, attractive. Left: Modified cowling and exhaust stack (note brace). Right: Complete job, with reskinning. Write Service Sales Mgr. for details, package price.



1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.

LOVE FIELD DALLAS

DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Circle No. 38 on Reader Service Card.

Gen. Agee, Civil Air Patrol Chief, Outlines $5-Million Training Program

A proposed $5-million Civil Air Patrol flight training program was unveiled recently by Maj. Gen. W. R. Agee, CAP commandant. Hoping to launch a test program next September (Congress willing), Gen. Agee said the number of trainees would rise from 500 to a level of 10,000 a year within a three-year period.

The program, he declared, would be conducted by U.S. fixed-base operators. The plan he outlined is similar to the recently legislated ROTC flight orientation program just getting under way. While it has been endorsed by the Air Force, it has "a tall mountain to climb," Gen. Agee said.

"Congress must pass a law authorizing the training and provide the funds," he pointed out.

The CAP flight training for cadets would call for a minimum of 35 hours flight time and a maximum of 42 hours. The course calls for 20 flight lessons, with a minimum of 17 hours dual and 18 hours solo and a maximum of 20 hours dual and 22 hours solo.

$500 Per Cadet

Fixed-base operators (qualified under CAA standards) would be paid $500 per cadet, with one half paid when the cadet passes the 20-hour CAA check and the other half when he gets his private license. "Washouts" would be compensated for at a predetermined rate, with maximum washout time slated at 12 hours dual and 8 hours solo.

The first year's program would be run on a limited scale in the Southwestern region, including Texas, Oklahoma, Mississippi, Arkansas, Louisiana, New Mexico and Arizona. Five hundred cadets would be awarded scholarships initially, producing a quarter of a million dollars in new business for fixed base operators in that region. The test area will be watched "under a microscope for the entire year" to "work out the bugs," Gen. Agee said.

In the second year, he continued, it is planned to open the program up throughout the nation with 2,000 scholarships.

"This will mean a million dollars of new business for fixed base operator across the country," Gen. Agee explained. "Then each year for the next three years we plan to increase the number of scholarships until we are awarding 10,000 a year. The plan calls for a 10,000 scholarship level each year thereafter. This will mean some $5 million of new flight training business for the nation's fixed base operators each year."

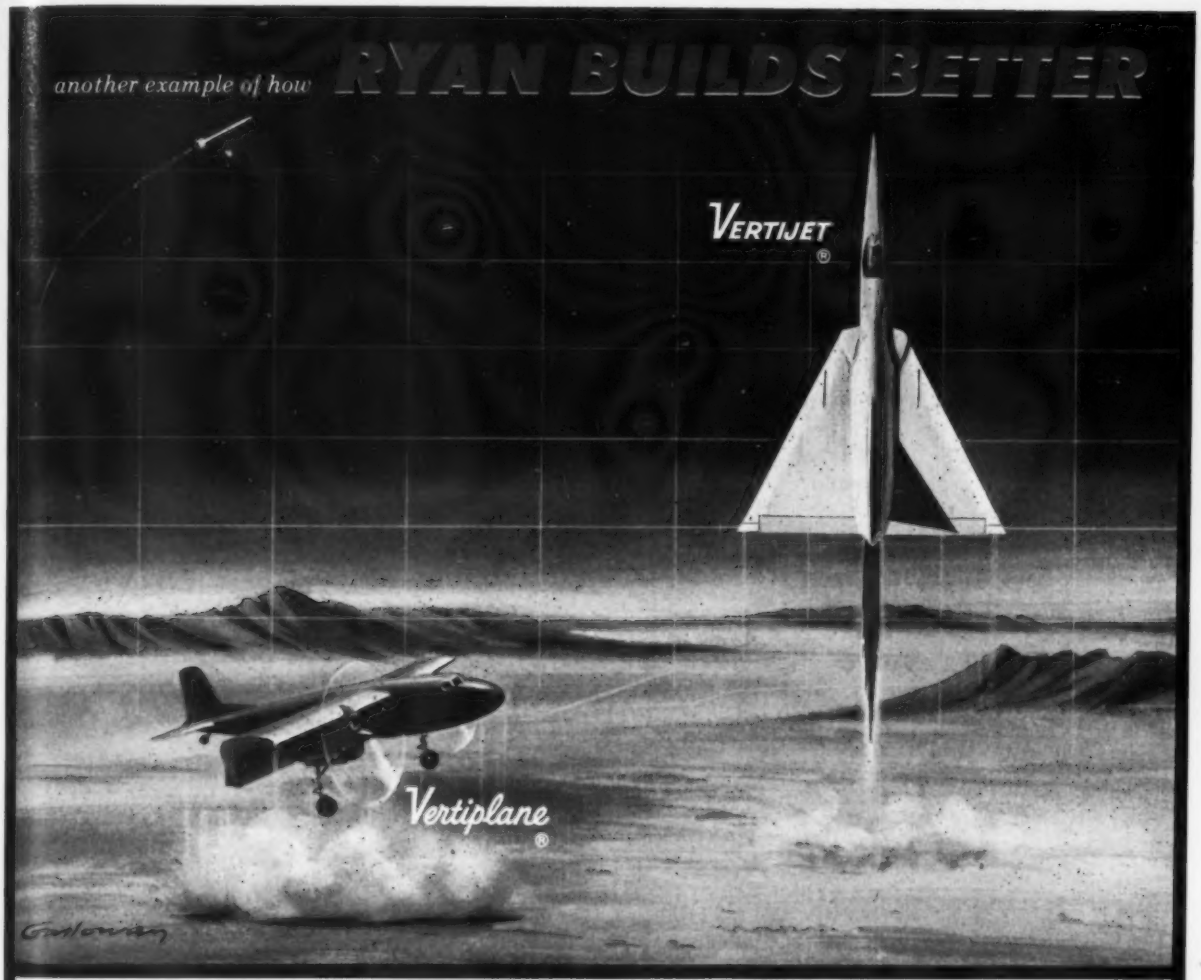
New Officers Elected

Disclosure of the training program climaxed the NATA annual meeting at which the following new officers were elected: President, Galen Bertram of Greensburg, Kans.; Eastern Vice President, Richard Washburn of Charlotte, N.C.; Western Vice President, Larry Hunt of Long Beach, Calif.; and treasurer, J. David Finger, Armonk, N.Y.

Industrial vice presidents named include: airports, Ed Oliver, Daytona Beach, Fla.; sales and service, K. V. Brugh, Jr., Greensboro, N.C.; repairs and maintenance, John Griffin, Lexington, Mass.; training, Edwin Lyons, Amityville, N.Y.; transportation, William Lotzer, Milwaukee; agriculture, John Neace, Phoenix; insurance and safety, B. G. Vandre, Winona, Minn.; technical trades, Al Biederman, Glendale, Calif. and miscellaneous, Robert Hudgins, Montgomery, Ala.

Wright Day Trophy Winners

Vice President Richard M. Nixon awarded the 1956 Wright Day trophies last month. Top, he is shown awarding Collier Trophies to Gen. Nathan Twining on behalf of the Air Force and William M. Allen, president of Boeing Airplane Co., for conception, development and operational use of the B-52. Center, with Dr. Edward P. Warner, president of the council of International Civil Aviation Organization, winner of the Wright Brothers' Memorial Trophy for public service enduring to aviation. Bottom, with Ray O. Mertes, United Air Lines, who received the Frank G. Brewer trophy, nation's highest award in the field of aviation education and training.



STRAIGHT UP: SHORTEST WAY INTO THE SKY

RYAN LEADERSHIP IN VTOL, achieved in close cooperation with the military services, is based on 2¼ million man-hours of research devoted to the development of Vertical Take-Off and Landing Airplanes.

The Ryan Vertijet type, developed under sponsorship of the Air Force, is the world's first jet-powered VTOL airplane. It is designed to take off straight up... fly and land... on a column of jet-hot gas! This concept combines flashing jet performance with the capability of taking off and landing at zero air speed. It eliminates the need for runways, airports, flight decks.

In the subsonic range, Ryan is developing its Vertiplane type for and in close technical cooperation with the Army and Navy. Designed to be as agile as a helicopter, it will have the speed and performance of fixed-wing aircraft. The Vertiplane will use large propellers and wing flaps to deflect air downward... enabling it to take off straight up.

Ryan's capability in this revolutionary new field is based on 9 years of intensive research and test to solve the major problems which lay in the path of VTOL flight. Ryan's success is making possible outstanding benefits to military and commercial aviation. Tomorrow's jet fighters can be widely dispersed—go into immediate action. Almost every naval vessel can become an "aircraft carrier." The mobility of military and commercial air transport can be increased by freedom from fixed airports.

Engineers will find a challenging future with outstanding opportunities at Ryan.

BUILDING AVIATION PROGRESS SINCE 1922

Aircraft • Power Plants • Avionics

Ryan Aeronautical Company, San Diego, Calif.

® REGISTERED TRADE MARK

Ryan

remember him?

Most likely you saw him. He appeared in our magazine advertisements from coast to coast.

This sales-minded executive was on a business trip, and we had this to say:

"He leaves his own car at home, takes a fast plane, and has a bright, new Powerglide Chevrolet Bel Air or other fine Hertz car waiting at his destination. That's The Hertz Idea!"

What's the angle for you?

Easy. *More profits!* By encouraging people (millions of 'em) to leave their cars at home, we encourage *more* airline passengers. Of course, we make more money, too. Plus—once they try the Hertz Plane-Auto Travel Plan, they'll use it again and again. Thus, *repeat business* for both of us!

So that's why we say: let's work together. Mention the "idea" of renting a car in *your* advertising. Makes sense. Hertz Rent A Car, 218 South Wabash Avenue, Chicago 4, Illinois.

More people by far... use

HERTZ

Rent a car

TRANSPORT TRENDS Washington, D. C., Jan. 14, 1957

TOP STAFF CHANGES have been approved by CAB. Raymond Sawyer, executive director, will head expanded international activities. He'll be deputy director of the Bureau of Air Operations, which is headed by Joseph Fitzgerald. A second deputy director will be named to head domestic activities. Slated for the job is Irving Roth, now chief of the rates division.

Executive director's post will be abolished. Duties will be assumed by Robert Kunzig, whose title will change from legal advisor-assistant to the Chairman to legal advisor-executive assistant to the Chairman.

Board's two safety bureaus—investigation and regulation—will be consolidated under a single director, Oscar Bakke. Deputy director will be named later to head safety regulation and safety investigation branches of the consolidated bureau.

●

1956 SAFETY RECORD of U.S. airlines was better than that of 1955, despite the 117 passenger fatalities at Grand Canyon alone. Final fatility rate of 0.53 per 100 million passenger-miles compares with 0.65 in 1955, marking fifth consecutive year industry has been below 1.0.

Big reason for improvement: Accident-free operation from June 30 to year-end. During 1956, airlines had only two accidents with 10 or more fatalities, including Grand Canyon. In 1955, there were seven such accidents. Total fatalities for the two years: 158 in 1955, 143 last year.

●

ALL-UP MAIL PROGRAM may be shaping up. Post Office says it's "giving consideration" to a move to raise first-class postage from 3¢ to 5¢. Also, it's "studying a revolutionary plan for a substantially improved mail service." Details weren't disclosed, but airlines assume the statements refer to an all-up mail plan. Carriers as yet haven't been briefed on P.O. studies.

Study made three years ago by Air Transport Association showed that all-up plan (5¢ rate, with all mail over 400 miles going by air) would cut P.O. deficit by more than 50%. And airlines would have no trouble handling the volume—the increased mail loads would take less than 10% of their excess capacity. Same conclusions hold true today, observers say. Financial benefit to carriers might not be too large, however. P.O. could be expected to insist on low mail pay.

●

BIG SHAKEUP MAY BE COMING in Italian civil aviation. The two airlines, Alitalia and LAI, are likely to be merged. On the government level, civil aviation may be removed from Air Force control and placed under a new civil aviation agency. These moves, considered by many observers to be long overdue, are being hastened as a result of widespread criticism of LAI. Already there has been a shakeup in the company, with dismissal of several top executives and appointment of General Urbani as president. Italian parliament and press are clamoring for changes not only in LAI but in the entire civil aviation set-up.

American Airlines Proudly Announces

NEW MERCURY SERVICE

America's most famous transcontinental service expanded to serve 6 additional cities

Luxury Leader in the World of Flight

For the first time, except on transcontinental flights, American introduces its famous Mercury service between the major cities listed below. It's nonstop or onestop on the world's fastest airliner and it includes such Mercury luxury as red carpets at shipside, reserved seats, superb meals—all at no extra fare.

In January Mercury Service will be inaugurated from

CHICAGO—nonstop to Los Angeles and San Francisco
LOS ANGELES—nonstop to Chicago and Washington, onestop to Detroit, Cincinnati and Boston
SAN FRANCISCO—nonstop to Chicago and onestop to Washington
CINCINNATI—onestop to San Francisco
DETROIT—onestop to Los Angeles
BOSTON—onestop to Los Angeles
WASHINGTON—nonstop to Los Angeles, onestop to San Francisco

AMERICAN AIRLINES

America's Leading Airline

Airline Traffic, Revenue for '56 Set Records

U.S. carriers score overall increase of 14.1% in passenger-miles over '55; freight, mail and express also register sharp gains.

By ERIC BRAMLEY

U.S. scheduled airlines set new traffic records in 1956, but profit margins, at least in the domestic field, may be narrower than in 1955.

Domestic airlines in 1956 were solely responsible for an increase of about 3% in domestic intercity passenger traffic carried by the nation's commercial transportation system, the Air Transport Association said. Domestic air passenger traffic gained about 2.7 billion revenue passenger-miles over 1955, while surface carriers lost about 871 million, it added.

ATA's estimates for 1956, based on first 10 months' traffic and nine months' financial results, show:

- The entire U.S. industry (trunk, local service, helicopter, international, Alaskan, territorial and all-cargo carriers) boosted its passenger-miles 14.1% over 1955 to 27,760,992,000. Ton-miles of freight increased 14.2%; mail, 8.7%; express, 8.6%. Revenue ton-miles were up 17.4%.
- The industry's total revenues were up 13.6% to $1,856,231,000. Passenger revenues, up 12.7% to $1,537,042,000, comprised 87.1% of the total.
- Domestic trunks increased their passenger-miles by 13.5% and passenger revenues by 11.5%.
- Subsidy payments rose 4.4% to $35,614,000.
- Industry's aircraft procurement program, as of Dec. 19, totaled $2,177,225,000 in positive orders and public statements of intention to order. Included are 213 jet transports costing $1,211,750,000, 183 turboprops at $460,750,000, and 271 piston-engine planes at $504,925,000.

Expenses Rising Rapidly

Although expense estimates were not given, totals for the first nine months showed that the domestic trunks' expenses were rising more rapidly than revenues. Unless the fourth quarter outgained the same 1955 period, net profit won't reach the $63.1 million total of that year. Increases in wages, prices and depreciation were contributing to the expense jump.

W. A. Patterson, president of United Air Lines, noted that his company has continued to absorb increased costs of wages and materials. "We have held our fares at 1940 levels but it is doubtful how much longer this can continue," he said.

Patterson predicted that UAL's 1957 passenger-miles would be 8% to 12% ahead of 1956.

The International Air Transport Association and International Civil Aviation Organization announced that 1956 world airline traffic (domestic and international, excluding Russian and China) totaled 78 million passengers, a 15% gain over 1955. They predicted a similar increase in 1957 and added that

Estimated 1956 Traffic of Scheduled Airlines

(In Thousands)

Traffic	1956	1955	Percent Increase
Domestic Trunk			
Revenue Passenger-Miles	21,811,993	19,217,615	13.5
Mail Ton-Miles	92,900	86,034	8.0
Express Ton-Miles	52,775	49,608	6.4
Freight Ton-Miles	191,745	174,023	10.1
Revenue Ton-Miles	2,482,927	2,190,640	13.3
Local Service			
Revenue Passenger-Miles	641,040	523,298	22.5
Mail Ton-Miles	1,511	1,257	20.2
Express Ton-Miles	1,827	1,427	28.0
Freight Ton-Miles	1,667	1,391	19.8
Revenue Ton-Miles	67,245	55,040	22.2
Helicopter			
Revenue Passenger-Miles	1,592	628	153.5
Mail Ton-Miles	88	96	(8.3)
Express Ton-Miles	34	31	9.7
Freight Ton-Miles	7	5	40.0
Revenue Ton-Miles	280	192	45.8
International			
Revenue Passenger-Miles	5,082,088	4,409,621	15.2
Mail Ton-Miles	56,785	52,409	8.3
Express Ton-Miles, Freight Ton-Miles	107,405	89,841	19.6
Revenue Ton-Miles	720,904	622,406	15.8
Alaskan			
Revenue Passenger-Miles	140,250	110,403	27.0
Mail Ton-Miles	2,438	2,379	2.5
Express Ton-Miles, Freight Ton-Miles	7,997	7,300	9.5
Revenue Ton-Miles	46,459	29,353	58.3
Territorial			
Revenue Passenger-Miles	84,029	78,130	7.6
Mail Ton-Miles	64	58	10.3
Express Ton-Miles, Freight Ton-Miles	1,506	1,646	(8.5)
Revenue Ton-Miles	8,940	8,759	2.1
All Cargo			
Mail Ton-Miles	1,174	322	264.6
Express Ton-Miles	832	.....	.....
Freight Ton-Miles	127,110	108,920	16.7
Revenue Ton-Miles	244,149	136,000	79.5
Total Scheduled Airline Industry (Including all Cargo)			
Revenue Passenger-Miles	27,760,992	24,339,695	14.1
Mail Ton-Miles	154,960	142,555	8.7
Express Ton-Miles	55,468	51,066	8.6
Freight Ton-Miles	437,437	383,126	14.2
Revenue Ton-Miles	3,570,904	3,042,390	17.4

the 100-million mark should be reached in 1958.

IATA said the number of passengers flying the North Atlantic may reach one million in 1957 for the first time.

"The economic balance of the air transport industry is still precarious," warned Sir William Hildred, IATA's director general. "The many, many millions invested in a new generation of aircraft will not pay off in dividends or in terms of cheaper transport for a much greater public unless there is an adequate improvement and expansion of airports and navigation aids.

"The airlines also view with some anxiety recent efforts by governments to increase the taxes and charges imposed upon them, and they are concerned that the forthcoming Universal Postal Union Congress may decree a cut in the rates paid airlines for carrying the mail.

"It is also disturbing to notice that the upward trend in prices which airlines have been able to withstand over the past decade has become unusually pronounced during the past six months." ◈◈◈

Competition May Force Jet Transports To Fly Lower, Symposium Hears

LOS ANGELES—The probability that domestic airline jet transports will conduct most of their operations at altitudes below the 35,000-ft. levels for which they are being designed was voiced here recently by M. G. Beard, vice pres.-equipment research for American Airlines.

Presumably referring to other than transcontinental nonstop flights, which make up the bulk of airline schedules, Beard said the lower-altitude operations will result from the speed competition among the carriers.

Addressing a Univ. of California symposium on the Ecology of Air Transport, the AA official also viewed the 600-650 mph speed range as the threshold for jet transports until fuels having "cheaper BTUs" are developed and means devised for greater passenger comfort.

Beard said AA anticipates that crew training for its turbine-powered transports will be no more difficult than experienced in the DC-6 transition, but that line maintenance and overhaul transition will be. Of jet fuels, he indicated carriers may be able to use kerosene rather than JP-4, although a freeze point of 40°F has to be accepted.

• **The two big problems** facing the airlines in venturing into jet operation are traffic control and transitioning, USAF's Col. J. C. Bailey warned. Traffic control may be the most critical problem to be faced in the next 10 years, he said. The Air Force has found by experience that jet flying is more hazardous than flying conventional-type aircraft, the military safety expert added, emphasizing such differences as the behavior of jets in crosswind landings.

Los Angeles Airways asst. flight operations manager J. J. Cunningham urged federal aid for municipal heliports. The final phase for helicopters such as LAA is mass commuter operation, he pointed out, suggesting that heliports could be rated as Class I, Class II, etc. similar to the way airports are classified in establishing federal aid.

Helicopter operators also need larger aircraft and more emphasis on low-cost factors, the LAA official declared. They're also handicapped by regulations carrying over from the fixed-wing field. The problems are wholly different, he pointed out.

Physiological Problems Doubled

Latest fighters, flying twice as fast and twice as high as their predecessors, have doubled our physiological problems, Lockheed Aircraft's C. L. Johnson told the group. He pointed out that it has become necessary to use automatic stabilization, because at very high speeds the human pilot needs mechanical help in sensing the need for control.

Earlier planes often attacked in dives, but modern planes like the F-104 with "zooming" climb ability, will attack in climbs, Johnson said. There is a great need, he said, for improvement in personal equipment, but "not to the point where the capsule for the pilot is the solution."

• **Johnson urged** new work to develop bailout techniques to be used in landings and takeoffs, since it is now possible—because of higher speeds under which a chute would open in a horizontal plane from the force of ejection rather than effect of gravity—to bail out on landing and takeoff.

Lockheed's very fast F-104 makes normal landings at an altitude almost

Estimated 1956 Airline Revenues

(In Thousands)

Traffic	1956	1955	Percent Increase
Domestic Trunk			
Passenger	$1,139,366	$1,021,853	11.5
Subsidy	2,756	3,192	(13.7)
Total Revenues	1,259,051	1,133,347	11.1
Local Service			
Passenger	$ 40,477	$ 32,841	23.3
Subsidy	22,381	20,714	8.0
Total Revenues	66,805	57,242	16.7
Helicopter			
Passenger	$ 429	$ 208	106.3
Subsidy	2,673	2,710	(1.4)
Total Revenues	3,558	3,355	6.1
International			
Passenger	$ 340,379	$ 294,828	15.5
Subsidy	1,614	1,583	2.0
Total Revenues	443,896	384,304	15.5
Alaskan			
Passenger	$ 10,333	$ 8,162	26.6
Subsidy	5,927	5,618	5.5
Total Revenues	29,535	22,324	32.3
Territorial			
Passenger	$ 6,058	$ 5,686	6.5
Subsidy	263	291	(9.6)
Total Revenues	7,402	7,114	4.0
All Cargo			
Freight	$ 21,858	$ 18,634	17.3
Other	23,699	8,336	184.3
Total Revenues	45,984	27,027	70.1
Total Scheduled Airline Industry (Including all Cargo)			
Passenger	$1,537,042	$1,363,578	12.7
Mail	62,141	56,449	10.1
Express	20,468	20,168	1.5
Freight	104,169	93,962	10.9
Subsidy	35,614	34,108	4.4
Total Revenues	$1,856,231	$1,634,713	13.6

the same as for jet trainers, but the technique for power-off landings is considerably different in comparison with older types of aircraft. Power-off landings have been made safely with the F-104, Johnson said, but an important physiological factor to be considered in flying modern planes is the effect of the steep glide path on the pilot's ability to judge when to flare out. Pilots must demonstrate excellent depth perception, he said.

• Dr. Hubertus Strughold, chief department of space, medicine, Air Force School of Aviation Medicine—The sequence of day and night is an extremely important ecological factor in human life. In intercontinental air transport we must reckon with five to 10 hours of time difference.

The human body generally cannot immediately adapt itself to the local time of the landing place, rather it takes a number of days. Consideration of the internal physiological time lag is especially important for crews of long distance aircraft.

• C. M. Christenson, director of safety, United Air Lines—"The hazards associated with the operation of high performance aircraft are, with the exception of well-established physical parameters, of size, speed, altitude and time, no different than those applying to present day equipment. The real and seriously important problem lies in organization and individual responsibilities of those who build, maintain and fly the high performance transport."

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NAL Uncovers Ticket Black Market

Diversion of dozens of reservations into the black market, where they were sold to "desperate travelers" at $25 to $40 a pair, has been uncovered by National Airlines in Miami.

A NAL reservations clerk, Maryls Anderson, was fired, and a Miami bartender, Harry Weiss, was arrested. Miss Anderson will not be prosecuted since she confessed and will be the State's main witness. Weiss will be tried on a misdemeanor charge of conspiracy to violate the statute governing sale of tickets on common carriers.

Miss Anderson reportedly removed 75 reservations cards on NAL flights leaving Miami during the Jan. 1-7 period and turned them over to Weiss, who is accused of holding them in fictitious names and selling them.

NAL said that IBM equipment, used to check elapsed ticket time limits and multiple reservations (AMERICAN AVIATION, Dec. 17), discovered the racket

CAB Extends TWA Routes to Manila; PAA Gets N.Y.—Nassau Nonstop Rights

In two important international decisions issued at the close of 1956, the Civil Aerounatics Board:

• Extended TWA's routes beyond India and Ceylon to Bangkok and Manila, effecting a round-the-world connection at Manila with Northwest Airlines. Route will be effective until July 4, 1959, expiration date of TWA's present Ceylon authorization.

• Awarded Pan American World Airways a five-year certificate to operate nonstop between New York and Nassau, Bahama Islands. PAA was selected over Eastern Air Lines, National Airlines and Mackey Airlines.

Both decisions were approved by President Eisenhower.

CAB's vote on the TWA extension was 4-1. Chairman Durfee, Vice Chairman Adams and Members Denny and Minetti said the route would provide "needed strength" for TWA and is in line with CAB's policy of "balanced competition" on foreign routes. PAA has had round-the-world authorization since 1947.

Member Gurney, however, said the new service is not needed and that the award will have an adverse effect on U.S. international aviation relations. He added that he had sent a separate confidential report on the matter to the President.

In the New York-Nassau case, Durfee, Gurney and Denny voted for PAA. Adams and Minetti agreed that a U.S. carrier should operate on the route, but they favored EAL.

New York-Nassau service by U.S. and British airlines was authorized by amendment to the Bermuda Agreement on Aug. 16, 1955. Seven months later, British Overseas Airways Corporation received an amended foreign permit authorizing the service.

The CAB majority attached a condition to the PAA certificate to prevent the company, which currently has Nassau-Miami rights, from operating single-plane service from New York to Miami via Nassau or "from holding out to the public expressly or by course of conduct that it provides service between New York and Miami." However, it refused to attach a no-subsidy clause as suggested by Examiner Merritt Ruhlen.

The majority favored PAA for the route because of "several economic considerations," most important of which was a "firm belief that revenues . . . from the . . . route will result in a reduction of Pan American's subsidy requirements."

Tele-Trip Policy Co. Cuts Insurance Rates

Reduced international airline trip insurance rates have been introduced by Tele-Trip Policy Co., and the company said that policies will be sold from coin-operated machines for the first time.

The rate, $1 per $12,500 worth of insurance, covers foreign flights, "flights where either the destination or point of departure, or both, are located outside of the domestic zone." Under the old four-zone rate system, maximum coverage of $62,500 for a U.S.-Australia trip, for example, cost $20. New rate is $5.

By moving to a two-zone system, foreign and domestic, Tele-Trip was able to simplify the application form and make machine sales possible, according to president Paul Brabazon.

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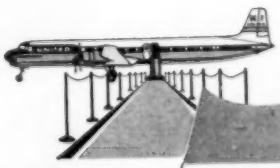

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News Briefs

TRANSPORT

• **Western Air Lines** expects to sell its last two DC-4s and possibly some of its five remaining DC-3s this year. Returns from the DC-4 sales plus increased earnings from operations should be sufficient to maintain present income level which, for 1956, approximated $2.9 million, president T. C. Drinkwater said.

• **Riddle Airlines** flew more than 40 million pounds of cargo in 1956, a 100% gain over 1955, and expects traffic to go up 50% to more than 60 million pounds in 1957, president John Paul Riddle said.

• **Independent Military Air Transport Assn.** reported that the supplemental air carrier industry had a perfect safety record in 1956.

• **Four airlines** participating in Air Materiel Command's Logair program flew 100,502,976 ton-miles in the first 11 months of 1956. During the corresponding 1955 period, airlines under contract flew 64,756,267 ton-miles. Companies under contract in 1956 were Riddle, Resort, AAIXCO and Capitol Airways.

• **J. B. Montgomery** resigned as vice president-engineering and maintenance of American Airlines to join General Electric Co. in Cincinnati as general manager of the production engine department.

• **Northwest Airlines** estimates that its 1956 net profit after taxes will be $3,222,000, an increase of $1,106,000 over 1955. Passenger-miles will total 1.1 billion against 1,017,000,000 in 1955. About a 15% gain in business is expected in 1957.

• **The Charles Adler Jr., Safety Foundation** has been formed to promote technological progress in the air and surface transportation fields. Founder is Charles Adler Jr., Baltimore inventor of a number of safety devices.

• **Eastern Air Lines** has sold seven of the eight former Colonial Airlines DC-3s to Remmert-Werner Inc., St. Louis, and has leased the planes back until replacement Convair 440s are delivered.

• **Thomas B. Wilson** resigned as deputy to Under Secretary of Commerce for Transportation Louis S. Rothschild to become board chairman of Johnson Motor Lines, Charlotte, N.C.

• **Bonanza Air Lines** is the first carrier to seek CAB approval for reduced fares for clergymen on a space available basis. Fares, effective Feb. 1, would be one-half of the regular one-way charge.

• **Illini Airlines,** Rockford, Ill., intrastate carrier operating from Sterling, Ill., to Meigs Field, Chicago, has bought a 15-place de Havilland Heron.

• **Scandinavian Airlines System** reported record net profit of approximately $2 million for its fiscal year ended last Sept. 30, against $1.6 million net in the previous fiscal year. SAS' passengers totaled 1,179,000, up from 931,000.

• **Continental Air Lines** estimates 1956 net profit at $750,000, compared with $395,564 in 1955. Company also announced that it will "plow back" all earnings during the current growth period to facilitate its $62-million expansion program, and that it will pay all dividends in stock instead of cash.

• **Pan American World Airways** arranged for sale of $30 million in promissory notes to supplement previously-arranged financing for its equipment expansion program. Notes carry a 4¾% interest rate and are subject to an annual sinking fund scheduled to begin in 1966.

• **Braniff Airways** will issue $40 million of 4¾% equipment mortgage sinking fund bonds, due July 1, 1976, in connection with its equipment and facilities improvement program. Bonds will be sold before April 29 to a group of insurance companies.

• **R. Vernon Radcliffe** resigned as associate director of CAB's Air Operations Bureau and will join TWA about Feb. 1 as director of economic research in the company's new planning and coordination department. He will be based in New York.

• **National Airlines** on Dec. 31 will terminate its $2-million-a-year advertising contract with Grant Advertising Inc., Miami. The account, which has been handled by Grant for about 10 years, will go to Hoite Agey Advertising Inc., Miami.

• **Western Air Lines** ordered $700,000 worth of Bendix RDR-1B X-band weather mapping radar for its DC-6Bs and for Lockheed Electra turboprops on order.

• **KLM Royal Dutch Airlines** sold two Lockheed L-749 Constellations to Aviation Financial Services Inc., aviation financing firm headed by Harold R. Harris, which will lease them to Pacific Northern Airlines.

• **Course computers** with a visual display are under study at CAA's Technical Development Center. Reduction of pilot work load might be a sufficient argument for further development of this device.

Planforms of Two Latest Super Connies

Lineup of the two latest Lockheed Super Constellations shows strikingly larger wing of 1649A (foreground), compared with 1049H (passenger/cargo version of the Super G). The 1649A wing is new and longest of any present transport—150 ft. Lockheed says it also is longest ranged transport, capable of nonstops up to 6,300 mi.

UAL Centralizes Its Weather Service

Airlines' meteorological 'brains' brought together under one roof in Denver; specialized forecasts and flight-planning advice given.

By JOSEPH S. MURPHY

There may be very little, if anything, anyone can do about bad weather once it arrives—but United Air Lines operating officials are making dead certain they know all there is to know about it while it's on the way.

Based on the results of two staff studies, one in 1955 and another last year, UAL v.-p.-operations D. R. Petty has set up a centralized aeronautical weather service second only in scope to that operated by the U.S. Weather Bureau in Washington.

Petty's aim was to organize United's weather service along modern lines. Instead of small regional offices at New York, Chicago, Denver and San Francisco, the airline's meteorological "brains" have been brought together under one roof.

• **A new weather center** at UAL's Denver operating base now supplies all weather information with the exception of flight-planning advice for California-to-Hawaii operations. A small office in San Francisco still handles this specialized service.

For domestic operations coast-to-coast, the new weather center provides specialized forecasts for all flights in excess of 1,500 miles; area type forecasts for *all* flights; thunderstorm advisories; and storm warnings for each UAL terminal as they are required.

Supplementing the new center activity, three senior meteorologists have been added to the weather staff under Petty to give technical direction to its forecasting operation. This group also will conduct studies in the application of meteorology to the safe and efficient operation of the airline.

Employs 25 Meteorologists

In all, United's weather center employs 25 meteorologists plus 10 weather clerks working under the direction of a center manager. Assigned to the staff unit are a total of five meteorologists who supply technical direction and conduct the studies in applied meteorology. Right now this group is working on no less than nine research projects, either short or long-term in nature.

In day-to-day center operations, five meteorologists and two clerks are on duty around the clock. They issue detailed trip forecasts for 55 long-range flights and 16 area-type forecasts each day.

During the thunderstorm season, 24 "thunderstorm grid messages" are prepared for broadcast to pilots in flight every hour on the hour. Special thunderstorm forecasts are issued frequently during this particular season and storm warnings may be issued for large blocks of UAL terminals on a given day.

• **Big advantage** of the centralized organization, according to UAL officials, is the opportunity it presents for individual meteorologists to specialize on particular weather problems. Under the new set-up, they can concentrate on these problems in a secluded office, then coordinate each problem with other specialists working with them.

The centralized unit also gives the forecaster many working charts and far more basic data than was possible at small isolated offices scattered over the airline system.

And it costs UAL nothing extra, other than the one-time expense of transferring personnel from New York, Chicago and San Francisco to Denver. Year to year operating costs of the center versus regional service are about the same.

Special Communications Room

To supply the last word in basic weather data to the center, United set up a special communications room housing 10 weather teletype printers, an automatic weather facsimile recorder and two printers on the company's telemeter circuits. Extra appearances were also installed on the airline's private-line telephone circuit.

Supplementing this flow of weather data, a C-band weather radar of the type used in United's operating fleet is also available in the staff unit for assistance in local forecast in the Denver area as well as for special studies.

With this battery of weather recording equipment, United officials are convinced the new center collects more aviation weather information in a day than any other office in the country with the exception of the National Weather Analysis Center in Washington.

Of equal importance to this array of equipment and data in any weather service is the technical know-how to apply it, and United's stock runs high in this respect. Some examples:

• H. T. Harrison, UAL's director of meteorology, is a 21-year veteran with the airline. He has spent 32 years in the field of meteorology, 11 with the U.S. Weather Bureau and USAF's Air Weather Service during World War II.

• T. M. Plunkett, manager of the new center, has been with United 28 years as flight dispatcher and flight dispatch manager until his new assignment. His record includes many past assignments in operational analysis and "troubleshooting."

Assisting Harrison is W. B. Beckwith, a 20-year weather man at UAL since graduation from Massachusetts Institute of Technology. J. E. Sorenson, specialist in upper air meteorology research, is a 15-year veteran and, until recently, served as head of the airline's Denver weather office. Top weather researcher for line station meteorology is

Wide variety of charts and teletyped forecasts are available to meteorologists in new weather center established by United Air Lines. Weathermen shown are (l. to r.) W. D. Beckwith, asst. director of meteorology; R. Schockley, meteorologist; T. M. Plunkett, center manager, and H. T. Harrison, director of meteorology.

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TRANS WORLD AIRLINES

Meteorologists at work in new UAL center. In foreground, Paul Stowell and W. Wilkworth plot high-altitude winds while Juliet Benedict and Marlene Knotts (background) chart forecasts for next 24 hours.

J. L. Deutsch, a 17-year UAL forecaster and former head of its New York weather office.

Looking to the future, United has given M. E. Balzer, another 17-year man, the task of researching weather for jet operations. In 1955, Balzer won the Edgar S. Gorrell Award for his research efforts in aeronautical meteorology.

• **Supplementing** this nucleus of key administrative and research weather talent is United's force of working weather analysts—with a background of experience that would make one wonder who knows more about weather, the U.S. Weather Bureau or United Air Lines.

The average forecasting experience of the airline's meteorologists is 14 years, and the combined total for its entire 36-man meteorological staff adds up to 503 years!

United's switch to the centralized weather set-up represents the first among the major U.S. airlines. American, Eastern, Northwest and TWA still supply their weather services from regional offices. Regional carriers such as Continental, Colonial (now Eastern) and Braniff have operated from a single, but small, weather office for a number of years.

Why the change? UAL gives two primary reasons for the central set-up, (1) to provide a better quality of weather service, and (2) to provide a uniform service for all departments in the company regardless of their geographical location.

Ideal Unattainable

Feeling among United officials is that, all other factors being equal, the ideal form of service is one that provides a complete set of weather charts and a briefing forecaster available to the pilot at each flight-planning point on the system.

But since United originates flights at 34 different airports over the country, it is obvious that it would not be economically feasible to maintain complete weather staffs at each of these points.

The alternative of operating from selected regional offices, as UAL did in the past, provided a reasonably good service at those points. However, it inevitably neglected the pilots and dispatchers located at other airports.

With the centralized service, United is now able to pool its entire complement of technical personnel under one roof, and to make their collective efforts and resources available to each other under working conditions that are most conducive to uninterrupted concentration and analysis of weather trends.

A modern communications network makes it possible to disseminate the results of these efforts rapidly to all pilots and dispatchers over the airline's system.

And under the United organizational arrangement, the flow of information is a two-way proposition. A private-line telephone circuit is made available for any pilot or dispatcher to call the weather center and be connected with a forecaster in a matter of seconds.

In this fashion, personnel at any point in the country are able to discuss features of particular weather problems possibly not covered in routine messages, and to get needed answers directly from weather center experts. ◆◆◆

Ecuadoreans Order F-27

First Latin American order for the Fokker-designed F-27 Friendship turboprop transport has been received by Fairchild Engine & Airplane Corp. from Aerovias Ecuatorianas (AREA). Delivery to the Ecuadorean airline will be in early 1958. The plane will be used on the company's domestic routes.

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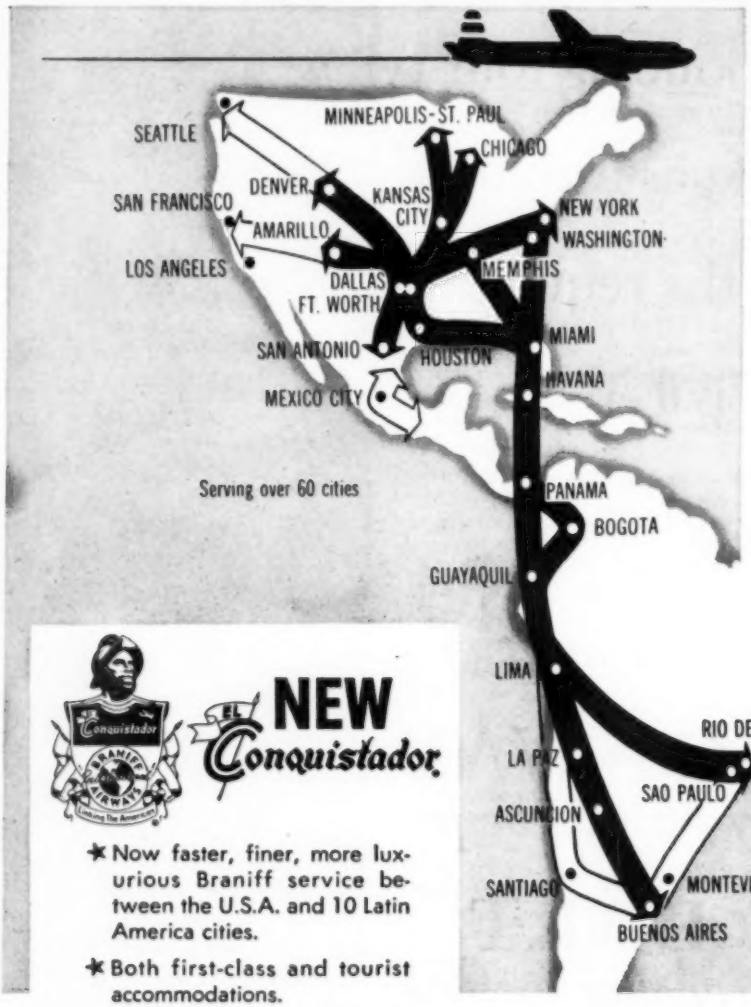

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Airline Commentary

By Eric Bramley

It's always interesting, when leafing through the Official Airline Guide, to note how many airlines use descriptive phrases at the top of their schedules and in their advertising and promotion. Let's see if you experts, without peeking, can identify the following: World's Largest Airline, World's First Airline, World's Friendliest Airline, World's Most Experienced Airline, America's Leading Airline, Airline of the Stars, Route of the Starliners, Route of the Northliners, Airline of the Executives, The Business Man's Airline. How did you score?

• • •

Speaking of the Official Airline Guide, we call to your attention a new feature in the January issue—an air traveler's worldwide hotel/motel directory. Listed are overnight accommodations in the immediate vicinity of or within easy reach of major airports. Also, airport eating facilities with opening and closing hours. Very useful when your passengers ask about accommodations.

• • •

We also call your attention to a new, humorous, easy-to-read book, "Fasten Your Lapstraps," by Geoffrey Willans, a British writer. Pokes fun at various aspects of air travel. We particularly enjoyed the following description by Willans: "Airports, wherever they are in the world, have one factor in common. They are never finished. Those airports that look as if they are finished are too small—and new building operations will soon be in progress: those that are half-finished will be too small before they are completed. The result, for the most part, is that the airline passenger is received and ejected in the different countries of the world through a series of temporary hutments of the most revolting character which are practically ageless in standing the test of time."

• • •

Also his comment on overnight bags: "On certain long-distance routes passengers are presented with a free overnight bag. The passenger can then walk around with a certain air of importance in local circles and his wife can use it for shopping until it drops to pieces—which won't be long. Like most things that are given free, there's a snag about the overnight bag in that it holds practically nothing." Book is published by Vanguard Press, New York. Price is $2.50.

Slick Launches New 'Sky-Van' Service

Slick Airways this month inaugurated "Sky-Van" service for the movement of household goods by air. Contracts have been signed with some 30 furniture warehousemen to act as agents for the service.

Slick claimed that Sky-Van will be cheaper than surface van, when all costs are considered. The service was made possible by a new aluminum container which it developed, the company added.

The container is 8 ft. long, 5 ft. wide and 5½ ft. high, with an elevated base for easy handling by fork lifts. Four containers will handle an average household, or about a 6,000-lb. shipment.

• **The program** calls for a minimum of 2,000 lbs. per shipment and a minimum distance of 1,000 miles. Regular service promises coast-to-coast delivery in four or five days; cities up to 2,000 miles, three or four days. On expedited service at a higher rate, Slick offers overnight delivery to any U.S. city.

From airport to airport, the rate is less than surface van charges. From door to door, the charge is $1 to $2 per cwt. higher than van. However, the company said that when the customer takes into account time saved and savings he can make on hotel, motel or other accommodations, Sky-Van will be $200 to $300 less than surface transport.

On moving day, Sky-Van containers are sent to the customer's home and household effects are loaded directly into them. On arrival, containers are taken to the new address and furniture is unloaded into the house. The service is under direction of Ed Breault, manager of the airline's Sky-Van Division.

Sales, Traffic, Promotion

National Airlines is now using "special representatives to the president" to expedite and facilitate the travel of NAL passengers. These representatives report directly to president G. T. Baker. They work in front of ticket counters, but don't wear uniforms, as do regular ticket agents. Former stewardesses, ticket agents, reservations agents and passenger service agents are filling the positions . . .

American Airlines is expanding its deluxe "Mercury" service from three to 12 cities. Limited heretofore to DC-7 nonstops between New York and Los Angeles and Washington-Los Angeles, the service will be made available on Jan. 15 to Chicago, San Francisco, Detroit, Boston and Cincinnati. On Feb. 3, it will be added at Dallas, Ft. Worth, Tucson and Phoenix. As contrasted with regular first-class, the Mercury service includes deluxe meals, red carpet arrivals and departures, reserved seats and other features . . .

Allegheny Airlines used an unusual method to publicize its new Erie-Detroit service. Products made in communities on the Allegheny system were sent, at three- to four-day intervals, to Detroit newspapermen. There were pretzels from Lancaster, Pa., peanuts from Wilkes-Barre, Pa., six quarts of top-grade oil from Bradford, Pa., bacon from Williamsport, Pa., etc. Idea went over big . . .

Airline sales officials will be interested in the first report on the **Burlington Lines'** Chicago-Denver "Slumbercoach," the new rail car designed to give privacy and a bed to coach pessengers for $7.50 a night over coach fare. From Oct. 28 to Dec. 1, when one coach was used, loads averaged 28.2 passengers westbound and 27.1 eastbound daily against rated capacity of 34, according to Railway Age magazine. More cars have now been added. The Burlington inaugurated the service to try to keep passengers on the railroad in the face of growing competition, and to attract new business. Slumbercoach is being used by coach-type passengers and the railroad doesn't think it is diverting many roomette or bedroom passengers . . .

Contracts

Commerce Dept. announced the following contract awards:

Hughes Aircraft Co., Culver City, Calif., $10,000,000, weapon control systems for interceptor aircraft.

Douglas Aircraft Co., Long Beach, Calif., $8,000,000, C-133A transports and related support equipment.

Radio Corp. of America, Camden, N. J., $7,749,473, amplifiers.

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., $1,305,033, wheel and brake assemblies for C-133As.

Lockheed Aircraft Service Inc., Jamaica, N. Y., $1,260,074, IRAN and flight test of 71 T-29s.

Convair, San Diego, $1,500,000, C-131E airplanes and related items.

Ryan Aeronautical Co., San Diego, Calif., $2,374,554, Q-2A drones and parts.

Curtiss-Wright Corp., Carlstadt, N. J., $600,000, B-52D flight simulators; $1,007,753, C-121C flight simulators; $300,000, MB-12A simulators.

Fairchild Engine & Airplane Corp., Deer Park, N. Y., $1,478,204, modification, development and manufacture of J-44-R-26 turbojet engines.

USAF's Air Materiel Command announced the following contracts:

Crosley Div., Avco Mfg. Corp., Cincinnati, $25,150,558, type MD-9 B-52 defensive fire control systems.

Riddle Airlines, Miami, Fla., $3,315,721 domestic air transport.

Utica-Bend Corp., Utica, Mich., $3,692,500, overhaul of J47s.

Lockheed Aircraft Corp., Burbank, Calif., $1,859,400, reconnaissance supporting systems.

Southwest Airmotive Co., Dallas, Tex., $1,383,840, overhaul of J33-A35 engines.

Aviation Gas Turbine Div., Westinghouse Electric Corp., Kansas City, Mo., $5,722,272, modernization and restoration of J46s, and $8,030,400 letter of intent for J34WE-36 engines.

North American Aviation Inc., Columbus, O., $4,139,520, letter of intent for 56 T-28C aircraft.

Republic Aviation Corp., Farmingdale, N. Y., previously-announced letter of intent to contract for $9,577,816 for modification of 484 F-84Fs has now been made a contract.

● **General Electric Co.** has taken temporary quarters in Danville, Calif., for new engineering facilities for designing future power plants for aircraft and guided missiles.

● **Dallas Airmotive** acquired a 20,000-sq. ft. warehouse in Brook Hollow industrial district, Dallas.

New Firms and Facilities

Granger Associates is a new company formed to engage in development and manufacture of electronic systems for military and commercial applications. President is Dr. John V. N. Granger. Temporary offices are at 801 El Camino Rd., Menlo Park, Calif.

Hoffman Laboratories will build a new electronic research and development building in the 3700 block of S. Grand Ave., Los Angeles, opposite the present Hoffman building.

A new western field service office has been opened by MB Mfg. Co., a division of Textron Inc., New Haven, Conn., producer of precision vibration test equipment for aircraft, electronics and other industries. Address is 10816 Washington Blvd., Culver City, Calif.

Topp Industries, Los Angeles electronics firm, has occupied two buildings in the Lennox area at 4957 W. 104th St., to provide expanded facilities for increasing production. Main Los Angeles plant is at 5255 W. 102nd St., with executive offices at 8907 Wilshire Blvd., Beverly Hills.

George L. Nankervis Co., manufacturer of test equipment, has occupied its new multi-million dollar facility designed to accommodate its own manufacturing operations and those of its recently acquired subsidiary, Commercial Research Division. Address is 15300 Fullerton, Detroit.

Avco Mfg. Corp. leased 3000 sq. ft. in the Mile High Bldg., Denver, for its operations. Nature of work to be performed was not disclosed. Avco is a prime contractor for the nose section of the Titan intercontinental ballistic missile which The Martin Co. will build near Denver.

Northrop Aeronautical Institute, Hawthorne, Calif., broke ground for an engineering education building at the corner of Aviation and Arbor Vitae Blvds., adjacent to Los Angeles International Airport.

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For career information every engineer should know, write: J. H. Papin, Personnel Manager, Dept. 56 1-AA, North American's Columbus Div., Columbus 16, Ohio.

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Displayed Advertising: $18.00 per column inch. Space units up to full pages accepted in this section for classified-type advertising.

Forms close three weeks preceding date of issue. Address all correspondence to Classified Advertising Department, American Aviation Publications, 1001 Vermont Ave., N. W., Washington 5, D. C.

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ADVERTISERS' INDEX

EN ROUTE . . .

WAYNE W. PARRISH

Fresh Meat Moves Fast in Congo

There are times on this globe when an American accustomed to moving about in our highly-developed cities gets a rude jolt. He finds that much of the world is still amazingly primitive by American terms and used to getting along in an economy of scarcity.

Russia was a jolt to me when I saw how backward it is and how little the people have in the way of worldly goods and food for daily living.

In the Belgian Congo on the Sabena press trip our group dipped back into the centuries. But one of the most fascinating such glimpses of primitive life came on our last Sunday morning.

We were in Bukavu at the south end of Lake Kivu. The local Sabena man took some of us in a station wagon to a market at Ngez, 14 miles from town. He said we were the first Americans to visit this Sunday market in the three years he had been stationed at Bukavu.

Weekly Affair

Over winding mountain roads we arrived at nothing but a pasture along the side of the road where some hundreds of natives had already arrived for their weekly swapping and buying and selling. Most of them had walked many miles carrying vegetables or crude pottery or materials and chickens and other products. Some had been picked up by a few trucks.

There were no structures in the field. Everything was laid out on the ground. The majority of natives were fully clothed but perhaps one out of ten of the women were open to the breeze above the waist. Some of the women's wrappings were colorful. The only Europeans present were a man and girl operating a mobile bank in a Volkswagen station wagon and it was interesting to note that quite a few natives were banking money. Otherwise the bank was used for changing money.

I'm no expert on native food so I can't describe the odd varieties of vegetables, beans and cooked stuff for sale, but most of it was unfamiliar and some of it smelled pretty awful.

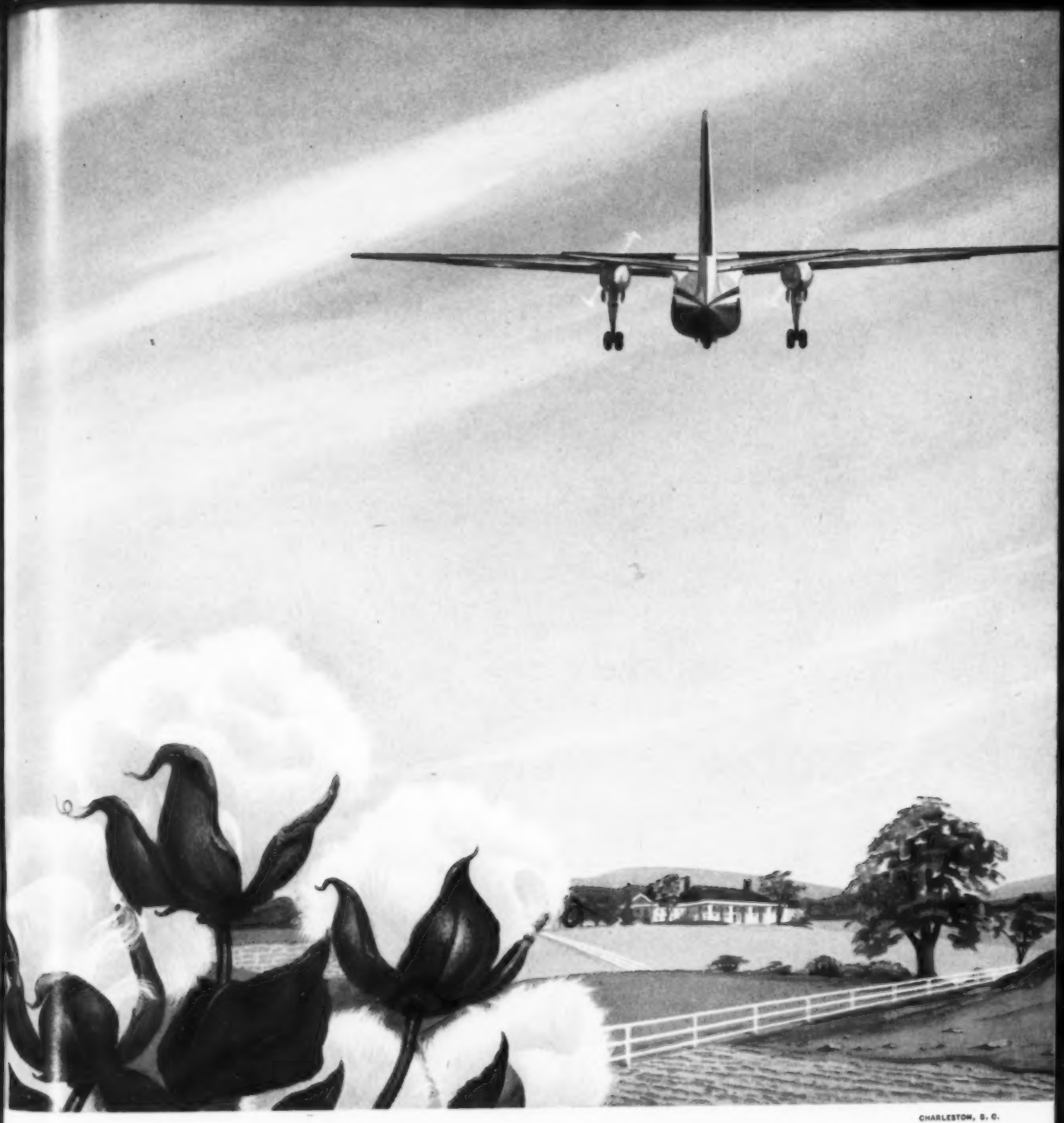
But the center of interest for me was the fresh meat department which occupied about half the pasture. From hoof to retail in ten minutes—or less. The natives were slaughtering goats and steers right and left in rapid-fire order. I watched some of the animals brought into the field, roped, thrown on the ground, throat slit, and cut up and distributed to specialized rows of products for sale on the ground, in quite orderly fashion—if you could stomach the sight and smell.

Strong Stomach

Some of those in our party couldn't take it, but my stomach is iron-clad, I guess. Some of the native women seemed to specialize in collecting the blood in large wooden bowls as it spurted out of the dying animal. Others went to work on other portions. Within minutes the heart had been delivered to the heart department, the liver joined other livers, the entrails strung out in the sun in another row, the head taken somewhere else, and the meat stripped off and deposited (to the glee of ample flies) for others to sell or swap. (They never waited for the animal to die.) Not a thing was wasted. There was a buyer for everything including the skins.

No meat market ever offered anything fresher, that's for sure. We wandered around the pasture for several hours looking over the merchandise and the people. I couldn't help but think that civilization in the western world is but a small part of the globe today. There are tens of millions of people living as people have lived for many centuries. The only thing added is a few trucks and a mobile bank and a few odd tourists from another world.

FROM HOOF TO HOUSEWIFE IN 10 MINUTES—Marketing in Belgian Congo, especially meat marketing, moves with lightning rapidity, as pictures on this page by Wayne Parrish show. It's primitive but efficient. In photo immediately to left, blood is drawn from animal just slaughtered. Cutting up sections for sale to cash (or barter) customers follows quickly.



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